

Name R. B. Gregg

Subject Farming

Instructor II

Date Begin July, 1930

J. L. Hammett Co., Cambridge and Newark

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May 1891

Agricultural Note Book TTT.

Richard B. Pegg

543 Bay State St
Boston, Mass.

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the steamer and loaded back
harbor in pitch dark
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One advantage of vegetable farming is that the kind and variety can be changed any year if a glut is threatened or insect pests or blights get bad. This is not true of trees or shrubs. So vegetables are flexible.

Sugar beets break up hard pan and aerate the soil well.

Use ~~biochemistry~~ biochemistry medicine ideas, - high potencies - for vegetables.

Use ants re soil chemistry & physics, soil temperature & weather. Observe spiders re weather, humidity, temp, storms. Perhaps other insects & birds will furnish valuable data. Destroy certain ants in order to control aphids.

~~There~~ There ought to be two & perhaps
 three kinds of farm account; ~~(1) energy~~
 (1) Efficiency of energy transformation,
 measured by rough approximation of total
 solar energy received compared with
 pounds of produce. (2) money income,
 expenditure, & capital account, with
 occasional cost estimate of parts.
 (3) Time out or lists of occasions per
 week or month by which human ~~interest~~
 liking & satisfaction are created.

G. book on Power
 Production

See also 1st Farm

note book re farm
 accounts. Combine
 these two.

abuse of manures and the function of garden tools. Bulbous plants have a chapter to themselves, as do ferns—which rarely flourish in town gardens—climbing plants and trees and shrubs.

VEGETABLE GROWING. By JAMES EDWARD KNOTT. 8x5½, 352 pp. Kimpton. 15s. n.

A work for agricultural students, by the Research Assistant Professor of Vegetable Gardening, Cornell University.

HISTORY

THE LIFE STORY OF BRIGHAM YOUNG. Mormon Leader, Founder of Salt Lake City, and Builder of an Empire in the Uncharted Wastes of Western America. By SUSA YOUNG GATES (one of his daughters). In coll.

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Carbon Dioxide as a Preservative.

Solid carbon dioxide may prove a possible aid in reducing the spoilage of fruits and vegetables in transit. The United States Department of Agriculture says that the carbon dioxide gas from this refrigeration gives added protection when supplementing ice. Dr. Charles Brooks, plant pathologist of the Bureau of Plant Industry, found that about 300 pounds of solid carbon dioxide placed in a refrigerator car loaded with warm fruit will increase the carbon dioxide content of the air sufficiently within an hour to check rotting and softening as much as would a drop of 20 to 30 degrees in temperature. The action of the gas in checking spoilage ceases after normal atmosphere is restored, but by that time the car has been fairly well cooled by ice and further spoilage is prevented by the usual methods of refrigeration. If the gas has largely escaped from the car within eighteen to twenty-four hours no objectionable flavor is likely to result, although peaches, strawberries, apricots and red raspberries easily lose flavor and become "flat" and insipid under extreme treatments.

Compare this with the fact that fruits & vegetables continue to breathe even after being picked. If they stop breathing they die. But plant respiration is different from ours. But surely there is more vitality (vitality) immediately after picking than many hours or days later. ∴ Small scale market is best for the consumer as well as for farmer.

McCullis 5 tons Meal

D. S. McCullis, 89 State St., Boston.

American Alco Co.

1740 Spruwell St. Philadelphia

The advent of machinery and science into farming is causing enough. There too and will drive farmers to raise their own food, self protection. They will also be driven to make their own cloth presently.

A. B. Rose. (Author of Big Crops from
Angie Apts Little gardens)
Bala-Cynwyd, Pa

Papex Co., Danvers, Mass.

In studying plant diseases
consider modalities etc à la
homeopathy.

Possibly constant cultivation &
chemical manures are a cause of plant
diseases & insect pests. Upsets balance of

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nature. Too much interesting.

Keep diary of crops & events on farm.
Record plantings, ~~sp~~ by rows, by dates,
by kinds. Have time tables, space tables
(distances apart & depths of planting). Times
give dates (approx.) for planting each kind,
elapsed times for transplanting, germination,
for thinning, spraying,
budding, flowering, ripening of fruit,
maturing of edible part. Run soil
temperature studies. Temp. & moisture for
germination. Elapsed time for root
growth e.g. ~~so on~~ rate per day.
Provide for experiments of dilutions of different
salts & effect on plants.

Make a timed schedule for planting and
correlate it with soil temperature & moisture &
with moon phases. Then check it off as it
is accomplished. Use efficient method of

engineers on this.

Things to lay in stock in winter
or early spring.

1. Beam & tomato poles
2. cardboard for collars vs. cutworms
3. Rock meal
4. Clips for above collars
5. Newspapers to cover transplants
6. Soot
7. Seeds all arranged in glass or tins so as to
keep nice away.
8. Have plan of garden all drawn & blue printed
9. Stakes
10. Lots of smooth ball bags,

So plowing ~~with the~~ and harrowing
by block & tackle and small gasoline
or electric motor. Such a motor can
be portable & ~~of~~ used most of time
for pumping water, ~~or other~~ ~~can~~ cutting
wood etc. Probably less expensive
than a tractor & more steadily useful.

Seed germination depends on
soil moisture & soil temperature &
~~is~~ ~~the~~ soil consistency. ∴ Planting
should be governed by those
factors. Perhaps ^{relative humidity} air moisture
affects top layer soil moisture
by absorption in either direction.
Is there also a soil relative humid-
ity? How can soil moisture be
measured. Perhaps soil thermometer
would help indicate planting time.

though perhaps a natural signal
like ants on certain kinds would
be still better.

June 6. Neighbor said that as he got older
he got less & less satisfaction out of
kitchen garden & went more to flowers.
That has its element of truth & is
perhaps natural for an old man whose
powers are failing, but on the
other hand the raising of vegetables
makes possible gift to the poor
& hence of beautifying & strengthening
human relationships in a way that
flowers do not.

Would it save time in planting
small seeds to dip string or raffia in glue &
then in the seeds & then let dry,

& lay the seeded string in the trench &
 cover over? Or do it with peas, stretching
 them to a paper tape so as to get intervals
 right & also depth of planting? If paper
 were soft it would quickly rot in the ground.
 By ~~leaving~~ leaving tape a width in relation to
 depth of planting, & laying it in trench
 sideways & covering with earth to the
 upper edge, that would ensure uniformity
 of depth, but might interfere with
 firming.

Try ~~sowing small seeds with a~~
 sowing small seeds (e.g. lettuce) in a
 line, firming it, shaking ~~soil~~ dry fine
 soil ^{very lightly} on it through a sieve and then
 covering with a 4"-6" strip of thin
 black paper - the paper almost like
 tissue paper, - & wetting it lightly.

This black would absorb heat, the wet paper would keep the birds from eating seed & keep it from blowing around & get ^{will} prevent the rain from washing & exposing the seed. Perhaps lifting soil on top of the soil would do with peas for example. Having the seeds near surface is like what would occur in nature & gives the seeds best chance to ~~keep~~ get warm & grow. Quick sprouting is a great advantage in getting early crops & at best prices.

How would it do to have chains or string shot or little bags of sand on strings to hold down newspaper tents above transplants. This would make for rapid putting on & removal. Better

than single stones. Or could make cement blocks with holes in them & string on ropes.

Have a blueprint of garden rows, with each plant row marked, kept under glass frame at side of garden, as well as several for use in house & in pocket.

Study soils & soil deficiencies & effect of homeopathic ^{dilution} solutions of various chemical salts on plant health.

~~How~~

Would the use of paper mulch help stem off weed infestation from blowing seeds? Might put it on at end of period of cultivation. Cultivation seems desirable for nitrogen production early in the game. Use of root on soil ought to

give good results for warming the soil. Then the power to keep soil cool during last of July & Aug.

By providing ^{best seed and} optimum sprouting conditions you lessen need for thick sowing and cut down labor of thinning later. Saves expense of seed and of labor.

To prevent infestation of cabbage worms & perhaps of other plants also, try using substances that give off odors that drive away insects or that disguise the smell of certain plants. Probably it is the odors of plants that attract certain specific insects, such as cabbage moth, potato beetle, cucumber beetle, etc. Certain soil tar preparations ^{resemble} this. Try naphthalene balls.

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the steamer and started back to the harbor in pitch darkness. He felt

Try training up cucumbers & melons over an arbor and growing peas and lettuce & other cool, ^{or shade} liking things underneath.

Instead of wood poles for vines, maybe steel fence posts with notches to hold wire would be cheaper, ~~drive~~ set in more easily and firmly, ~~and~~ last longer, and store better over winter. Cedar poles at Bucks are \$1.75 per dozen. 1931. But get better in mass.

To learn about mulch depths, soil moisture, depths to plant seeds at different seasons, sink a small pane of glass in the field to level with soil and from time to time brush away the soil from one side so as to see condition of soil on other. Allow for heating of glass by sun, surface

tension along the glass, etc.

Pigeons (squares) live on surrounding country much as birds do and reproduce faster than chickens. Per pound they also bring a higher price than chickens, & eat less. They are perhaps healthier than chickens.

^{see Willis}
Rock meal analysis is

K_2O	3-5%	
P_2O_5	$\frac{1}{4}$ of 1%	Alumina 12-24%
MgO	2-5%	Si (nephrite) 27-39%
S	5-9%	
CaO_2	1-3%	So this has
MnO	2-4%	lime, phosphorus
FeO_3	4-9%	and potassium,
MnO_2	$\frac{1}{4}$ - $\frac{1}{2}$ of 1%	which are <u>the</u>
Titanium Oxide	$\frac{1}{4}$ - $\frac{1}{2}$ of 1%	elements which

are not manufactured in the ground or by the plant but which are taken away in the crops. Probably these other minerals are needed by plants to keep up their resistance to disease. They may also help keep the soil free from fungi.

If ~~plant~~ straw rotting in ground uses up nitrifying bacteria, why will not roots do the same? Cf. A. B. Ross' ideas for making humus.

Might be able to thin rapidly by using a toolbed box ^{with teeth} spaced right. Perhaps adjustable blades.

The steady rise in Ry & other transportation costs not only makes it

poor policy to raise & try to sell stuff in distant markets, but also increases the price of stuff shipped in from outside & $\therefore$ increases likelihood of success in selling to local market. Vegetables are used everywhere & ~~that~~ their use is increasing.

Use a hired girl to do selling. ^{girl} ~~the~~ will like being trusted, has better eye for detail than a man, is keen on buying & price comparisons, is more conscientious than most men. Get girl from Ag. school. Perhaps use girls for weeding & picking instead of boys. More delicate fingers & handling & perhaps more easy to organize & control.

Farm work will mean giving up

Have strength to create my own ideal.

much reading, most city contacts, no newspaper
 -machines instead, most contacts with India,
 all college contacts. D. Local leadership,
 sadhana & inner discipline, Teaching,
 perhaps local talks, notes & perhaps some writing.

Vegetable crops have an advantage
 over grains & fruits in that many of
 them ripen faster & so give a steadier
 more frequent money income & turnover
 on solar energy. Can raise several
 crops a season. But have both & get benefits of
 both.

Quick freezing & Dry Ice will
 make it easier for the big veg. growers,
 but his market will be mostly cities.
 Country growers will be less apt to
 use expensive methods. Also some
 conservative people will prefer fresh.

vegetables. Perhaps taste + vitamins
will still be better with fresh
stuff. Chain stores will use modern
equipment. Also many housewives
will not ~~know~~ learn how to defrost
rightly, & then will spoil the
food. ~~See~~ Much freezing is less
applicable to vegetables than it is
to meats & fish & hard fruits.

shotgun.

1932

Raises Cotton in New Hampshire.
FRANKLIN, N. H., July 22 (AP).—Homesick for Texas, Mrs. Alfred Ayer, county home demonstration agent, has succeeded in raising the garden products of her native State in the soil of New Hampshire. She has successfully raised sugar cane, cotton, watermelon, okra and peanuts in a season almost too cold for native products.

EXPLAINS CARE OF HERBS
Department of Agriculture Tells How to Grow Them in Winter.

Savory herbs growing in the garden may be brought indoors for the Winter and planted in flower pots or window boxes in a sunny window, says a plant specialist of the United States Department of Agriculture.

During recent years there has been revived interest in aromatic herbs for flavoring soups, meat dishes and salads, and it is a great convenience to be able to pick a few savory leaves right in the kitchen. Mint, thyme, tarragon, sage, dill, chives, watercress and rose geranium are as popular today for flavoring as they were in Colonial times, although not as much "store is set" by medicinal herbs now as then. Some of the herbs may be dried for Winter use, says a bulletin from the Department of Agriculture.

The best herbs to grow in a window are mint, watercress, parsley, chives, sweet marjoram, basil and rose geranium. They should be transferred indoors before freezing weather into a soil consisting of one part sharp sand, one part well-rotted cow manure and two or three parts of good garden loam. A very small quantity of bone meal may be added. The soil should be mixed thoroughly and screened through a coarse screen.

LITTLE-TREE FARMS ATTRACTS THOUSANDS

Since Little-Tree Farms in Framingham Centre has adopted their popular cash and carry policy, literally thousands have driven out to the Farms, made their selections, loaded the plants and headed for home again in a genuinely happy frame of mind. Substantially reduced prices and the maintenance of their usual high quality have caused thousands to be attracted to the "plant-mart" at the Farms.

Scores of varieties--hundreds of plants including roses, perennials, flowering shrubs and decorative evergreens may be found on display awaiting the inspection and selection by the many visitors at the Farms.

The area devoted to the "plant mart" has recently been extended to more than twice what seemed adequate a few short weeks ago. Here may be found plants to satisfy every conceivable home decorative need.

Adjoining the "plant mart" is the big glass garden store, the only one of its kind in the country. This beautiful and unique building is devoted chiefly to the display of garden pottery in rich and distinctive colors, wrought iron work, garden tools of all descriptions, horticultural books, bird houses and garden furniture.

Visitors and guests at the Farms are amazed at the superb beauty of the display, the high quality of the plants, and the moderateness of the prices.

LOCAL ITEMS

Mrs. Charles F. Hasey of Woburn president of

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My Agricultural Policy

1. Intensive small-scale cultivation, and local sales, preferably on roadside stand, to avoid large overhead, high labor cost (1), transportation costs, slow turnover, middlemen, low inventories, intensive use of solar power. About 12 acres.
2. Vegetables, honey, and in winter mushrooms ^{& perhaps kelly or other mushrooms.} & weaving (panels part), ^{for export.} Perhaps pigeons for squabs, & a few chickens, ^{Fish in pond.} Perhaps a few sheep for wool & 2 or 3 goats for milk, ^{& continuous} This gives steady use of land & equipment & time, ~~a wide distribution of part of~~ ^{market} a distant market for part of stuff whose value is high in relation to bulk & weight; a local market for majority of product; some of the product a necessity, some a luxury; quick turnover; full use of radiant energy; use of neighbors'

lands (bees & pigeons); low distillation or sale costs, variety of product

4. Sheep for wool, goats for milk, their manure ^{+ eggs +} for garden, pigeons or chickens for meat; a ^{small} ^{stock} pond, ^(?) for fish.
5. Use A. B. Rows' system to avoid need for rotation, to save moisture, to reduce risk of drought, to save labor & time, to increase soil fertility, to increase use of solar power.
- [6. Use Adco ^{equivalent} instead of cattle to make manure] This may benefit from neighbors' land. Buy straw ^{hens & hay} & make manure for sale.
7. Dry surplus vegetables & fruits
8. Use selected trees for permanent annual crop. Also grapes for raisins.
9. Perhaps have a little space in a dry crop or aromatic herb, - peppermint, etc
10. Plant enrich soil of other land with

and looses & mixes subsoil i.e.
deepens the soil.

alfalfa, (field) peas, or soy beans. ^{alfalfa} also uses
subsoil moisture. Use alfalfa with peas.

11. Use ~~soy~~ soy beans for protein. Dry &
use them with sprouts. Also sprout
beans & peas for winter use.

12. Potatoes for starches. ^{with & soy beans for proteins}
^{& fish. Ferment potatoes}
^{with beans for insects.}

13. Use Rock Meal for soil enrichment.

Or some phosphate, potash & lime

14. Perhaps Chinese compost method

15. Try Persian - Maori pit or stone
method for sweet potatoes or other
~~potatoes~~ roots. Paint stones black for the

16. Work out rapid methods of germination
of seed so as to produce early vegetables.

17. Use ~~to~~ paper mulch or weeds & to conserve
moisture.

18. Use charcoal to sweeten & darken (warm) ^{the}
soil. E.g. Charred straw.

19. Woodlot for fuel.

20. Have water piped (from well) to garden
for watering & also frost protection.

- 20a. Some strawberries & raspberries.
20b. Cornett often with Gout Aug. Sept. - late Aug. Sept.
20c. inoculate beans & peas.
~~20d. protective companion plants.~~
20e. Sunflowers and Rose Hedges for Vitamins D & C
21. Try out plant pills in water & electricity
by wires buried in soil.
22. Try out planting time in relation to
lunar changes
23. Try effect of growing vs. rock ^{or cement} ~~a~~ brick walls.
24. Sanddges for frost protection.
25. Use root to add N & to darken & warm soil. This
will tend to hasten early growth & protect us from frost.
26. Experiment with salts to maintain high resistance
to disease
27. Perhaps a little wheat.
28. Develop ^{protective} companion aromatic plants to repel insects.

This policy should cut down the
usual farmer's rules, viz.

1. Drought, - Ross method, ^{more} water pipes, alfalfa, ^{more} mulch, adco,
2. Insect pests, - Rock meal, ^{salt} ^{appts.}, early start of growth, aromatic companion plants.
3. Plant diseases, - Wind, & variety of product,
4. Frost, - ^{good} water, dark soil, Ross method, ^{mulch}, drainage, ^{Nisori} method.
5. Scant yields, - Rock meal, ^{adco}, charcoal, root, ^{Ross method}
6. Market losses, - Ross method, local sales for most of

q p. 51.
stuff, stuff adapted to local sale, some distinct sales, early stuff,
good feeding & packing, cash & carry, developing confidence
once, variety of produce, cash apps, frequent turnover, increase

Tops

7. Overhead costs. Vegetable farming. ^{Maori method, goats} ^{variety -} ^{these low} ^{Ross' method helps.} ^{tiny agrie} ^{Requires more skill, tho.}
8. High labor costs, - Ross method, ^{Maori method}
9. Weeds, - Ross method, ^{tiny agrie} paper mulch, adco, rock mul.
10. Hail & wind storms - covers on tiny agrie.

Set of Experiments to Try

1. Plant jills
2. Planting in relation to lunar cycle
3. Maori system
4. Sticking seeds to paper tapes at proper spacing, for ^{accurate} ~~uniform~~ depth of planting, prevention of sinking into ground.
5. Rapid methods of germination. Cf. Campbell water treatment, rocking or moistening, etc. Put on brick & regulated temperature water & get fairly accurate germination times. Plant just before, using some sort of drying enough to make ^{rapid} planting easy.
6. Try certain crops, ^{as alliums} - i. e. fleg, wheat, aromatic

back on dry plant

7. Paper models scheme
8. Buried wires for electric currents.
9. New method of killing insects
10. Keeping off insects with odors, e.g. cabbage caterpillars. Try something to hide cabbage odor. ~~also with an~~ moth balls (?)
11. Test to know from natural signs the right time to do certain operations.
12. Darkening soil with soot to avoid frost.
13. Consult earlier note books on this
14. Try adeo manure for mushrooms.
15. Soil temperature and relative humidity determinations, re seed germination. Then try to control by various ways.
16. Develop aromatic ^{protective} companion plants to repel insects e.g. nasturtium for squash bugs, rue to keep flies off, pennyroyal to repel ants & caterpillars; aptias others to repel moths & their caterpillars; flax for potato bugs.
17. Effect of moon phases on planting times.

I suspect that the reason why horse
manure is only kind for mushrooms is
its texture, ^{body & even moisture content} and heat. Ought to be able
to imitate its texture, ^{& even moisture content} with suitable
materials in Adco manure, & Adco supplies
plenty of heat.

The large garden row record ought
to have lines for each row & then columns
for following data: - plant, date of planting,
date first sprouts appeared, ^{date of transplanting,} date of thinning,
dates of spraying, budding, flowering, ripening of
fruit or maturing of edible part. Correlate
planting time to lunar cycle. Dates of

Diary should record ~~rain~~ ~~time~~ hours &
elapsed time & rough intensity of precipitation
of all kinds, temperature at 2 times per day,
whether sunny or cloudy, ~~what days~~ any

event or change for each crop - e.g. planting, transplanting, sprouting, blossoming, fruit setting, maturity of edible part, appearance & or destruction by ^{of} any disease or insect pest, behavior of ants & birds,

Prices at Hingham A & P store
about June 15. - Beets 15¢ ^{per} bunch,
carrots 15¢ for 2 bunches, tomatoes 2¢ 25¢,
cucumbers (2) 15¢, celery 25¢, spinach 15¢

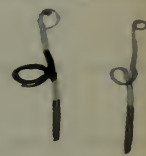
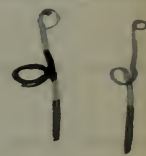
For seeding it might be better instead of using a paper tape to glue seeds to, to use a tape of cheese cloth, - a la surgeons bandage. Use either glue or perhaps varnish to attach seeds. Unroll it & stretch it on table or board, brush glue or paste on it, sprinkle seed at right intervals, let dry & then hang up or roll up. Would be

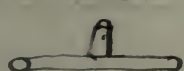
stronger to carry to the field, would
stretch better & be less apt to tear
while laying in trench; would rot quickly
would be similar to fibres support needs
better in case of hard rain, preventing
them from ^{inking deep into ground.}
But might not rot, then catch in (cultivation) & tear up whole row.

When needs fall in nature they are on
^{damp.}
top of ground, supported by "fibrous
~~damp~~ structure of grasses, leaves & roots.
Then they roll under a leaf or are
lightly covered by leaves & sink a
^{Chinese cloth, damp is like this.}
little through winter. The aim is to
be near top of soil to get warmth of
^{spring quickly.}
sun, and yet not to be exposed by
washing rains. How would some
black dyed straw or more match do,
or black paper ~~paper~~ to prevent
washing in early spring rains, to
hold in heat, to cover as first. Then

roll up again in May as soon as it is
time to cultivate.

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I'm putting down ^{roll} paper mulch,
instead of holding it down with
stones or earth. Try heavy wire
pins about 6" or 8" long with a
loop extension at side thus:  
One of these every 2 yds on 
each edge ought to do it, be quick
to insert & help to keep people away
from.

I'm planting, firm it down in
trenches with a rounded stick
with handle, ~~a board~~  or
a board edge, to give even pressure.
Then sprinkle from a (watering)
can an even covering of pulverized
earth. Let it be dry & it will

absorb moisture from soil. But its
dryness will permit even distillation
to & covering.

The usual standard of 15 acres for a
minimum size of farm was based on
necessity of crop rotation & manuring from a
cow. Ross system eliminates the former
and also ^{a good share of} the latter, so perhaps smaller
average would do.

The quick freezing methods will be
expensive & ∴ will be more effective in
cities than in villages. ∴ Village
market will remain. Distribution charges
will increase, not decrease. That will
be the salvation of small farmer with
local market. Also perhaps he can
sell to quick freezers. ^{The prices per pig are high.} Vegetables will sell well
in winter.

A. B. ROSS
ATTORNEY-AT-LAW
BALA-CYNWYD, PA.

PHONE, CYNWYD 1683-W

March 18th, 1929

Mr. Richard B. Gregg,
Bemis, Tenn.

Dear Sir:

Your letter has been forwarded to me by Minton, Balch & Co, and only reached me this morning.

Cynwyd Station is 6 miles from the Broad Street Station of the Pennsylvania Railroad; and if you will phone me I will be glad to have an interview. Unfortunately I live in an apartment and have not been able for the past two years to get ground for a garden. Also much of my work has kept me in western Pennsylvania, so that I doubt if a garden would do either of us much good.

The book itself is rather a prophecy or forecast than a system which our own people will follow today. After I had written it I got hold, through a friend, of "Farmers of Forty Centuries" by Dr. King, of Wisconsin. It is published by the Democrat Publishing Co., of Madison. It describes the three-crop system of farming in various parts of China; but without analysis of the factors of efficiency.

Another book of great value as throwing light on the subject is "The Law of Diminishing Returns", published for \$1 by the World Book Co of Yonkers-on Hudson, New York. This also I procured after I had written the book on Gardening. I suspect that the writing of the book sprung out of a series of articles I had written for the Farm Journal, Dr. Spillman and I being closely associated and in sympathy with the subject matter of the articles.

The system of gardening takes into account a number of elements... the sun-power as an increasing and diminishing power plant for growth; the intensive planting as a means of great water conservation and use, the side by side placing of finishing and starting crops, for better utilization of the elements of time and space, catalysis through the mixture of various elements of fertilizer and the inoculation of the legumes, the increase of soil fertility through constant root additions in place of manure, the retention of soil balance through a rotation within a single year, and certain other factors of productivity the importance and proofs of which I have worked out since writing the book, and which I hope to publish, along with other new matter, in a book on which I have been working for about six years.

There is no reason why the system cannot be worked out for intensive trucking in which proper machinery replaces horse power, although, of course, not to the same extent as where the man and the hoe do the work. It is a matter of inventing machinery for quantity production; the present tools will not do the work efficiently. And hand labor, for a long time

A. B. ROSS
ATTORNEY-AT-LAW
BALA-CYNWYD, PA.

PHONE, CYNWYD 1683-W

to come, will be prohibitive in cost; perhaps we will never have to go back to it.

As a matter of actual practise, the 4 $\frac{1}{2}$ crops a year is possible only to the most careful gardener. I have repeatedly had them, but every step taken in the garden had to be with caution. Three crops a year, however, are easy to get and without the dangers of tramping and destruction where one becomes too ambitious.

However, the whole matter is in an academic stage. The tendency towards mass production with machinery has taken the field and will continue to occupy us until the pinch of necessity forces us to improve our methods...and that seems to me a long way in the distance. We, through the use of modern transportation methods, have developed certain favored sections as our sources of food supply, and others, not so favored but which could compete with better methods, have dropped out of the race. That will, in my opinion, continue for a very long time; because there are opportunities so to improve the methods of extensive production as to meet our growing needs for a long time to come.

Here and there, however, we find choice spirits who are not willing to follow in the ruts, and whose work is slowly but surely reacting on the generality of producers.

Now I must put a finis to this screed. I could go on, of course; but hope that we will have a chance for a conference, and then you can ask me what questions you have in mind and I will do my best to give you an answer.

You might, if you prefer, stop over for a few hours in Philadelphia, and let me know where I can meet you; and if I am in the City I will do so. For the next six weeks I expect to spend a good deal of my time in the mountain district of Pennsylvania, where I am looking over some lands and valuing them for certain estates....large tracts which take a good deal of time.

I will be very interested to get your report on gardening in the interior of India, particularly where there is no irrigation. My own view is that, in this temperate section, a rainfall of 30 inches is quite enough for full growth during all the growing days of crops planted as closely as consistent with a fair distribution of sunlight. In the more tropical regions, of course, heavier rainfall would probably be needed.

Very truly yours,



Alan Benin tells me that dark rough surface would probably radiate heat more slowly than it absorbs heat, because the absorption is of short rays while the radiation is of long rays. This would work out all right as far as germination. Indeed the fact that it radiates some heat would tend to keep the leaves of the plants warm as well as the ground.

In order to work variations ^{the Ross system} & to use _x to best best efficiency, I ought to know & have tabulated the sizes (width & length) of each & every ^{annual} vegetable, ~~together with data~~ at every useful stage in their growth under normal or average conditions. Also their ^{also their length of growing season.} type & size of root system. I require from Dept of Agric & from Ross where I could

Mothballs Keep Mosquitoes from Descending Chimney

MALARIA-BEARING mosquitoes emulate Santa Claus in some parts of the South. When they find doors and windows screened, they come down the chimney seeking whom they may devour, and bearing unwelcome gifts of "fever 'n' ague." But you can keep them out by hanging a little basket of naphthalene, the stuff mothballs are made of, at the top of the chimney. They hate it, and will zoom out of its range as soon as they smell it, no matter how much good biting may lie slumbering below. This is one of the curious facts about mosquito behavior which have been learned by the United States Public Health Service.

Not all mosquitoes will enter houses by coming down chimneys, and it is not known whether all of them can be driven off with naphthalene. One species, however, responds in this way, *Anopheles quadrimaculatus*, the four-spotted malaria mosquito. But she is important enough to make this bit of entomological knowledge very much worth having.—*Science Service*.

"Boundary" Rays Reveal Counterfeits

get this information. Then work it out in definite interlockings. ~~stop to approximate~~
Then see how it varies under optimum conditions & then try to attain & maintain the optimum. Thick walls of smoke would help cut down radiation & frost hazards.

Work out the angle of the sun at each 15 days for the latitude we settle in. Use this for spacing rows.

33
← Try the effect of this near cabbages to see if the odor will keep off flying aphids and cabbage moths, - either by repulsion or by disguising the smell of the cabbage plant. Could one use D or the insect killer by using cabbage oil inside to attract the moths. Try other aromatics to keep insects off other plants.

The year before I use my plot for garden it might be well to row it to a mixture of inoculated soy beans & alfalfa, & plow it under in the autumn. That would loosen & enrich the subsoil and ~~enrich~~ ^{enrich} the upper soil & also smother weeds.

Try to estimate capital investment & operating costs per acre. Would need a tractor plough, a hand cultivator, 2 wide rollers, 2 narrow rollers, 2 hoes, 2 trowels, ~~beam~~ poles, stakes, string, shovel, spading fork, wooden rake, heavy crowbar, ~~fence~~ ^{wire} iron fence posts & ^{wire} fencing & 2 gates, a hatchet, files, a carbide wheel for sharpening tools.

Perennials would be strawberries, raspberries, asparagus, (rhubarb), mint. Also some fruit trees e.g. 2 apples, 2 pears, 2 peaches. Grapes.

Consider whether you could mingle either some perennials or some annuals among the perennials, E.g. some beans among the strawberries; some lettuce beneath the grapes or under the trees. Might have to grow the lettuce in pots sunk in the soil, to prevent competition with tree roots. Or can have certain shade loving flowers or ferns under the trees or in the grape arbor, also planted in pots.

In the southern ^{vegetable} markets they sell bunches of different ^x vegetables together for soup. Soup bunch. E.g. Celery, carrot & onion.

Be sure to have much of my farm
in clear view of the road, so as to
prove to passers-by that ^{the stuff} it is genuine &
really well managed & fresh. No one has found
that appearance count a great deal in selling

I ideally it would be better not to
have chickens because of the expense of
buying feed for them, especially through the
winter, and the fact that they tie you down
so. Goats (milk) would feed entirely off
what I could raise myself. But these
would be better still as source of protein.
Pigeons look after themselves.

If I am located near a town there will
be plenty of gardens to which I can sell
Also made manure.

Since the

If the plant pill in water arrangement would work, it would be fairly easy to warm water artificially early in the spring & start stuff before the soil can be plowed at all. Growing in water that way would protect it from frosts, even though exposed to open air.

Will have to compete with Frozen Foods on the price. Also some people will continue to want stuff entirely fresh. If by Ross method & other ways I can cut down time & labor, reduce insect & plant disease losses, reduce frost losses & drought losses, - all at relatively little expense, and at same time make soil, then I can compete in both price & quality with frozen foods. Ross method will also give me a long selling season.

All vegetables ~~not~~ picked but not sold or used overbur can go into compost heap, for later use

in nature or for our own soil enrichment.

The ~~temperature~~ ^{rise} of temperature necessary to cause germination of seed, - given adequate moisture, is slight.

At spring time a relatively slight stimulus of slightly higher temperature is enough to cause germination. Therefore, given right moisture conditions, the amount of extra temperature caused by darkening the soil or changing the slope of the land would be enough to start the plants. ~~I suppose~~ Once started they will probably take care of themselves. The main thing is for them not to lie in cold wet ground. Then they rot. If they get nipped by frost the loss is the cost of seed plus cost of labor, and on the newly planted

crop just after that you are not behind your
 nearly competitors. And if the plants do not
 get nipped by ~~early~~ ^{late} frost you gain probably
 one week's sales free of from local compe-
 tition. Also you enhance your reputation for
 skill. Reckon the probabilities by weather
 records and see whether it is sound to take
 the chance.

By planting ^{only a few} in E & W rows and just
 N of them having ~~an~~ galvanized sheet iron
 fence tilted at the right angle, the
 reflection of sun's rays on that nearly
 ground should warm on dry it
 enough to help quite a little.
 Perhaps white painted wall board would
 be equally good & less expensive. Have
 it in place several days before
 planting. Also it would act as a
 wind-break.

Chromium
 plate

Another advantage of an early start is that it cuts down risks of loss by insects and increases the chance for subsequent crops, - enables more to be raised off the land. Seven days start may be 5% of the total growing season, and a 5% difference is often accountable for success or failure.

I suppose that the conditions which start germination influence the seed enzymes, start the change of starch to sugar and various other chemical changes. ~~So the~~ Requires probably oxygen as well as heat and moisture.

Many of the larger seeds may profitably be sprouted in damp cloths, to avoid soil fungus, to enable rejection of infertile seed, to gain

time. E.g. Corn, lima beans, N.Z.
 spinachs, string beans. But it requires
 gentle handling & time. Balance the
 loss & gains of time. Spent in frames
 that can be carried right to the field.
 Have ^{fine} earth of right moisture & counteracting
 to spinners — gainfully.

For ~~the~~ assistants, under the Ross plan,
 must have people who are careful and
 intelligent and interested.

Look up in some book on spiders
 & other insects to see which are weather
 wise and how they show it. Also
 some other insects,

The fact that the Birds eye frozen
 food degenerates ~~after~~ it in a day or so

after it thaws in the refrigerator, means that it is not as usable as ordinary fresh food. This is true of vegetables anyhow. Only users of electric refrigerators can keep the stuff frozen, and even they may not be able, because the freezing place is often filled by ice & ice cream, so this will cut down the strength of its competition. Very good for delicatessen trade in cities, but not so much in small towns.

Ree Ross plan: It is true that we will flourish partly because of utilization of all the space, but we must remember that nobody tries to get at weeds in order to pick their fruits or themselves & so no room is needed for that, I.E.

Rosa's plan requires very great care in stepping & moving around. That is one reason for long handled implement. With them can reach between & under foliage & not break off stuff. But note the every-other-row spacing of any one kind of plant, so as to make gathering easier. &

It would really take a period of say 11 years (min spot & dry cycle) to prove fully the value of Rosa method over others, - to give all the factors and chances & probabilities time to work and offset each other.

This closeness of planting is a disadvantage for picking produce, if you do not use care in selection and training of help.

Might it be possible by some deliquescent salt or otherwise to ~~control~~ take the excess moisture out of the soil in the early spring, or to heat the soil by chemical means?

It is reported that gossypine on end of cut banana stems prevents rot.

Would a smear of vasoline on cut stems of vegetables delay wilting & rot, e.g. lettuce, corn, tomatoes, etc.?
chard.

Try naphthalene flakes near vegetables to repel various kinds of moths & insects. How about the corn borer?
All the special insects for special plants are presumably attracted by their smell. $\therefore$ aromatics of some sort could drive those insects away.

For surface cultivation after plants grow big, in Ross system, use a six-inch

or ruffle-hoe
rake, on end of a long bamboo pole. That
will get between the plants easily &
save tramping down the ground and
lessen danger of breaking plants.

To work out prior & follow crops
well get a table of the normal
ripening periods of every vegetable that
can be grown in the latitude.

I have a half-acre or so of asparagus,
as it probably will always sell well.

Experiment with growing crooked
neck squashes on poles, using nets for
the fruit. Or perhaps on trellises,
with lettuce or perhaps even peas under-
neath, since they are cool weather
plants.

Use care in selecting varieties of each

of kind of vegetable, to fit the season

8

The Ross method of planting, by its mixture of plants may tend to reduce damage from insects. Perhaps the mixture of plants blends odors & so does not attract the insects so much, or if it were some sort of rays given off, there might be interference. It is more like the mixtures of plants in nature, - a balance of growths, no congestion. Similarly, in case of wind blown spores of fungi, the different heights and separation of rows might well help to reduce this danger.

The radish started best in shade of tree. Does radish

prefer cool & shade? while it is young
or always?

In the Maori method there are
several advantages; - ease of harvesting,
no weeding, ^{no} cultivation (stick ^{hot bed,} building
provides air, ¹¹ triple to quadruple the
surface exposed to sun. Good for potatoes,
sweet potatoes, beans, peas, cucumbers,
squashes, melons, (see next page). Rotate soils,
instead of crops.

My first crooked neck squash, Aug 8, 1931,
was $13\frac{1}{2}$ " long & $4\frac{1}{4}$ " largest diameter.

Another advantage of the Maori method
is that the soil can be mixed &
made of just right proportions. Would
work well with Adco.

GIANT VEGETABLES REPORTED BY SOVIET

New Farm Method Is Said to
Increase Size and Yield
Ten and Twelve Fold.

MANY TONS TO THE ACRE

Extra Rich Fertilizer Is Used and
Plant Growth Is on Frame
Work Above Weeds.
1933 & 1932.

By WALTER DURANTY.

Wireless to THE NEW YORK TIMES.

MOSCOW, Aug. 3.—The newspaper Izvestia has discovered a Russian Luther Burbank named Zolotof working at an experimental cotton plantation near Bokhara. If half what is asserted in a four-column article written by Zolotoi's associate, Agronofski, is true the Soviet Union could lead the world in cotton production within ten years.

Agronofski declared the Zolotof method has produced an average of five tons of cotton an acre, ten to twelve times greater than last year's average in the Bokhara region. Experiments with other plants produced 120 tons of potatoes an acre, 110 tons of tomatoes, 90 tons of Egyptian beetroot, 175 tons of cucumbers, &c.

The tomatoes weighed two and a quarter to three pounds each, cabbages weighed eight to fifty pounds, and betroots ten and a half. Eggplants grew a yard and a half long and twenty feet high and tobacco six feet or more, with 150 leaves to the stem and an acre's yield of dried leaf was seven tons.

The method consists mainly in setting the plants of any culture in soil piled with a sort of wattle framework of canes and cane piping, through which irrigation water percolates to feed the plants from below. This, it is asserted, eliminates weeds and the cumbrous weeding now required three times a season. The method also permits fourfold denser planting and the hot sun and fertile soil of the section, which once was the garden of the world does the rest.

Agronofski says the initial cost of preparation, plus seed and fertilizer, amounts to 700 roubles (\$350 at par) an acre, but will last for five years, thus reducing the cost to 140 rubles a year. Taking the lowest price for cotton, he calculates a return of 2,000 rubles an acre yearly. With metallic wattle and tubing, which cost no more than cane if produced on a mass scale but which would last twenty-five years instead of five, the cost per acre would be correspondingly reduced.

Agronofski demands first, that representatives of State farms and collectives and agricultural experts be sent to Zolotof's station to investigate for themselves, second that more ample funds be placed at his disposal and an adequate number of qualified hands, third that all collectives in Centrasiya be ordered to try Zolotof method on at least one acre and State farms on at least 100 acres, and fourth that a new State farm be formed at first with only 500 or 1,000 acres to use the Zolotof method exclusively with metal tubing and 100 per cent mechanization.

This correspondent understands that the Commissariat of Agriculture is profoundly interested and proposes to follow these suggestions.

I could use
a sub to good
advantage in
making Adco
manure. If
wood, treat
inside with a

water proofing
paint. But why not
use its full benefit by
means of hot bed, - to use
its heat also. Might
learn to put something
above plants to intercept
the long infra-red rays of
radiation at night.

The main method by
reason of separate soil & hot bed

can be started a couple of ⁽²⁾ weeks earlier in the season and therefore lengthens the growing season. It could be used on alluvial or on land otherwise not good for cultivation.

In Maori system it would be desirable to have some sort of small mechanical shovel or hoist to arrange the earth in the terraces. Is the Fordson, e.g. arranged for such a thing, or how about some of the ~~be~~ factory movable elevator devices & trunks. Calls for plenty of water & controlled water. It controls more factors than ordinary farming, - the water supply, the earth moisture, soil temperature. Think growth & moisture, imitates tropic forest conditions. By grouping "

number and terraces at suitable intervals
the infra red radiation that night would
be partly trapped & go back & forth
instead of up into sky. Perhaps the
extra humidity around them would
also tend to retain heat. Have a
mixed break.

Masson system would be good only
for long season or 1 crop a season crop, as it
is ^{probably} too much of a job to remove the piles
more than once a season. Perhaps not
though. In the Masson system the
vines on top could be trained to a
trellis on N and then lettuce grow
underneath on N side. It would get
early AM & late PM sun only.
Perhaps peas as a cool weather
plant would do well under such
shade.

Nasutium planted among squashes
keeps away squash bugs. Experi-
ment to find other instances of
this sort.

The description of *Naviculus* in book
is not exact enough. Requires further
expt. For example, as the soil at
bottom sinks might it not tear out
off the stems of some of the tubers.
Also there does not seem to be soil
enough for intermediate layers.

W. Atlee Burpee Co. - Seeds.
P. O. Box 1626 Philadelphia, Pa

In view of the desirability of using
fruit sugars instead of starches for bee
food, it would seem wise for home use

to ~~have~~ grow plenty of grapes and dry
them as raisins. Also have 2 or more
apple trees, ~~and~~ some nut trees. Perhaps
several other fruits suitable to temperate
zone. Keep a goat. Then would

"Colony Schemes for the Flower
Garden" by Gertrude Jekyll, 7th ed.
Country Life, Ltd. London.

The farmer is the only producer
who buys in a retail market and
sells in a wholesale market as
would be loss. This is a solid reason
for selling locally at retail

an excellent article on small
scale farming in Feb 1932

number of Mexicans "Mercury" (My).

It is said that for the average farmer his raw material is mostly soil, air, & ^{supplies} water, & so the fact that they have to buy at retail is not so bad. He found that his tractor got out him more than anything else. He showed that the risks & variables of farming are so great that you can't apply factory methods. Not enough control, & besides the idle time is great & the overhead expense of much machinery, if mechanization is used, is too great. Say the ag. implement ^{& machine} people now sell many more small units than big ones. Also that Calif farms started big but have grown small. That even the corporate farms are best worked in small units by tenants.

An interesting article on bee keeping
in *Engineer Review* (London) for
Jan Feb 1932, says that such live
webs (as sort of overhead apparatus) a
force of bees for guards, for ventila-
tion, water gathering, cleaning, & grub
feeding. If the hives are small
or weak the proportion of this
overhead is too great. Best to have
big hives. Also he says that bees
dislike odor of perspiration & of
stables. ∴ Keep clean. Also that
queen lays more or less ofc to amount
of food given her. That makes
makes them such & fill up on
honey & that makes them
"mellow" - not vicious, ∴ Use
gentle puffs, not strong.

KClO₃ solution spray kills nettles
(perhaps some other plants). Remember
that it is explosive when dry, so do not
allow dry splashes of it on clothes or
instruments to be near wooden structures,
dead leaves or such.

Horses beat tractors in regard to
expense of repairs. Horse feed may be
as expensive as oil & gasoline, but the
animal repairs itself. This is another
item in the economics of small holdings.
When prices go down, the horse farmers
win over tractors, in Canada as matter
of actual experience.

Gandhi's hat (excellent) ties up
closely with a tree-farming program & is
a conservation of soil

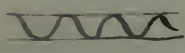
London Spectator, Mar 5, 1932 reports
that the small farmers of Cornwall make
more off their flowers than off other
crops.

An excellent book on vegetable
growing - "Practical Gardening" by Hugh
Fendley, Appleton, \$2.50 (want)

Another - The Backyard Garden - Edward J.
Farrington, Stratford, Boston \$1.50

Everybody's Garden - Walter Pritchard
Eaton - Knopf \$2.50 (1932). About
simple planning

For cardboard containers to start
seedlings in - Plant Protector Co.
7 Commercial St.
Rochester, N.Y.

For vegetable garden, instead of individ-
 ual bean poles why not two tall L
 iron fence posts at the ends of the rows
 with one or two wires from one to the
 other. Then a set of curtain rings on these
 wires with spacing by a ^{cord} string knotted at
 right distances which draws across &
 ties for season. From each ring a
 woven wire tape  coming down to
 a ^{strong} stake, wood or iron. Beans & peas can
 climb on these. The whole thing probably
 much cheaper and certainly more
 permanent ^{& easier} to handle than a lot of
 bean poles. Would not occupy but
 very slight space for storage in winter.
 Work this out carefully. Perhaps might
 make & use netting like fish netting for
 peas. Makes it easier for person to move between
 rows.

A good article by Sement Harris
on "What Hope for the Farmer" in
Current History for March 1932.

He says that seed, fencing, canning
jars, a brood sow, cows, & chickens are
necessities for a self-sufficient farm.
But I would cut out the brood sow &
substitute a goat for a cow.

Nail a wooden clothes line onto
side of house or post. Then open it &
insert stem of vine. Thus can support
vines etc. strongly & get easily
removed for painting, in autumn, etc.

How about an adaptation of this
for tomato vines?

Get some herbalist books to suggest
aromatic plants to keep bugs away from

vegetable plants by intercropping. E.g. nasturtium for squashes, mustard for wheat. Also get a good botany book for similar suggestions. U.S. Govt pamphlet on marketable herbs. Also get an entomology book for similitudes & bugs, as bugs of similar families might be repelled by similar or same plants. E.g. nasturtium among potato plants might keep potato bugs away. Try Mint, lemon verbena, — grain, mint major, etc.

An interesting article on making herbata a science in the Saturday Review, Apr. 16, p. 32. Refers to Mrs. C.F. Seydel - "The Magic of Herbs", and a Society of Herbalists in London. Also "The Scented garden".

This is a branch of ^{ecology} apiculture. Wide range of experimentation is possible.

Roots no closer together than your roots or
widened roots but flourish so well.

Although close planting à la Rose
may bring roots closely together, the competi-
tion of roots for nourishment is not too
keen, I think, and the ^{drawbacks of} competition for
water are offset, ~~by~~ perhaps, by
advantage of having all the ground
area shaded so that moisture loss is
reduced & uniform soil temperature
increases bacteria & mould activity &
thus increases amount of plant food.
The water that evaporates is at least all
put to constructive use. Possibly the
individual plants may be a little
smaller, but I doubt it because of
more plant food. The big growth
comes in early months before the
root systems are fully developed.
Even if the separate plants were smaller,
the total yield would be greater.

dictary
Because of ^{various} basinity of grapes, peaches,
caneets, ^{beets}, potatoes, limes, lemons, almonds, chestnuts &
probably other nuts, be sure to have
all these on the farm.

Mason method saves trouble of cultivation by providing more aeration & ~~has~~ no danger of packing surface of ground by rain or heat. Greater aeration probably promotes more soil bacterial action & $\therefore$ releases more soil ^{nourishment} ~~nutrients~~ & helps keep soil warmer & more constant temperature. Weeding is easier because you can stand up for most of it.

Use some of research work re
factors that control flowering and
fruiting (bal of N & carbohydrate, light,
wound, water, pruning, root pruning, etc.)

(ecological factors), and apply it to forecasting
honey flow and hence to the manipulation
of bee colonies.

"A Manual of Beekeeping" by E.B.
Wadmore. Arnold, London, 1932,
15s. Most complete of British books
on this topic.

"The Scented Garden" by Eleanor
Sinclair Rolfe.

Settles needs to grow fast, & before weather gets hot
needs a rich soil. Needs to grow
fast also because it is a leafy
vegetable. Johnson Clarke gets good
results with non-heading celtuce
sown thickly in the row without
thinning.

The New England Farmer - a monthly
 monthly. Subsc. Dept. Myrick Bldg, Spring-
 field, Mass. 60¢ a yr. Fair. All round.

Burdell & Shaw Co., Somersworth, N.H.
 Rototiller - a garden tractor.

Write to Mrs. Agie School for address
 of others.

The May 1920 Nat'l Geographic
 Magazine has illustrated article on
 common U.S. mushrooms.

Why not utilize the Kaduna floating
 garden idea if I have a pond.

Dalton thinks there is no profitable
 intermediate stage between a one-man
 farm with no hired help except perhaps

a fixed extra labourer at harvest & plow
time, and a 3 or 4 man farm with a
man & wife assistant, the wife boarding
several ^{from} labourers constantly. This is because
a single assistant never works well
unless you work alongside him all
the time, and it is hard to do both
superintendence plus selling and the
working too. Better than this, &
~~that is an~~ temporary labor arrange-
ment is, I think, to have a layout
that will use all my time steadily
throughout the year at steady work,
well balanced at all seasons. To

Why not combine the Kashmir
floating veg. bed with a greenhouse top
and warming the water by circulation
through a small coil over a small

benzene or oil or coal burner? might
 even do away with the glass covers or
 use coated cellophane and perhaps black
 tar paper over the water margin. Beds
 might be ~~very~~ made of straw or sphagnum
 moss and then ~~a few~~ chemicals fed in
 the water.

If I buy a Rototiller, I can save
 money with it, working for neighbors.

$$\begin{array}{r} 2.35 \\ .05 \\ \hline 16.75 \end{array}$$
 If I can save \$16.75 a year by it, the
 interest on the investment will be saved. That
 might mean working 5 or 6 days with it.

Life of average farm machinery is 12 yrs.

The info. says ~~the~~ no Rototiller has been
 used up in its 14 yrs of info so far. In

Calif, a dealer who has sold ^{of them} 400 machines

has not had as much as \$50 worth of repair
 charges on all of them in a year? (same to buyers?)

"Be Your Own Weather Prophet" by
E. S. Payer, Gordon, Cassell & Co, 1932.
3 s. 6 d. It says to get about 40
photos of cloud formations in your
neighborhood, for all the seasons & all 4
quarters of the sky. Note on back
the season, temperature, barometer, time of
day, & quarter of the sky, ~~that~~ and
what the weather was for about 3 days
preceding & 3 days following. That
will give you typical indices and
the basis of fairly reliable ~~the~~ local
forecasts.

Re Astrolabe $360 \div 12 = 30$ per yr.

Besides earning money by using it for others
I will earn their gratitude for its good
work. By increasing neighbors' prosperity
as well as my own I share in the prosperity

of the neighborhood. By good plowing I increase the speed & amt of growth of my crops & thus get early crops, a good market & greater freedom from insects & plant disease. ~~By~~ Being able to break up & control witch grass will be a great economic saving.

The Westinghouse electric people have developed an electric heater ^{+ temperature} & control for greenhouse beds. By getting uniform optimum temperature they speed up plant growth very greatly & cut down loss of transplants very much. ^{Very good for} ^{allowing} to get it well started before hot weather comes. Also for peas.

By getting best ~~weather~~ physical & chemical soil conditions, but temperature & moisture the plants are made much more efficient converters of solar energy.

contain far more vitamins, & ~~are~~
are more tender & tasty & finer looking
and so gain a better market.

Re our idea of putting food
recipes in with baskets of vegetables,
why not have them printed on
paper bags? Also little things about
making them tasty, - apt quotations. etc.
about good cooking, etc.

Do not plant more of any one crop
than I can harvest myself in the period
allowable under usual crop & weather &
market conditions. Try to dovetail
the harvesting times & have an even flow
of work. Work this out pretty
carefully in advance, with some
leeway for attraction due to differences

of weather.

If Technocracy's prophecies are true it will be advisable to be self supporting as soon as possible.

In buying new machinery allow for interest & ^{depreciation} ~~obsolescence~~, and relate them to area of farm. ~~See~~ Make sure that what they cost will more than cover interest, repairs, & depreciation. Try to get tools that can be put to many uses. Obviously a plow cannot be used much, so I must earn money by plowing for others. Offer to clean up witch grass, mow lawns, do vegetable gardens for others. Plow my own land both to raise food for self & to provide good cover crops & get my land in best condition.

Among vegetables he used to have Jerusalem
artichokes and celery root.

With the ~~new~~ Rototiller I can
probably do work, for town to pay all
my taxes, - preparing road beds, town
lawns, cutting soil to be used for road
surfacing, ditching, mowing.

If I can work off my ^{town} taxes, raise al-
most all our food, make the cloth for
our suits & all other cloth, and do a
little writing to pay income tax, we can
make good. Might write some articles
for farm papers or do local editorial
work on the local town or county paper.

Have a hand made cart & perhaps a
trailer for the motor car to tow around.

all sorts of loads, - vegetables, hay, firewood,
coal, earth, etc.

Can have a woodlot entirely separate
from the farm, - even a couple of miles
away.

eat
his
ver
bs.
ty-
Rats can be banished from the cellar
by using chloride of lime. Sprinkle lib-
erally on the cellar floor, or wherever
their haunts are suspected to be.
A picture of Napoleon on a wall

a
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si
h
n

Publications Secretary,
Agricultural Experiment Station,
Berkeley, Calif.

KNOWLES A. RYERSON
U. S. DEPARTMENT OF AGRICULTURE

IN CHARGE OFFICE OF
FOREIGN PLANT INTRODUCTION

BUREAU OF PLANT INDUSTRY

Rolled cow manure
advertised in Boston
paper, Nov, 1932 at
\$20. per cord. In a
New York paper, Nov, 1932 at
\$1. per bag of 100 lbs.

Horse vs Tractor. The horse repairs himself & his feed for the work period is cheaper than gas. But he eats every day & uses up time daily on feeding & caring for him. Also takes more room in stable & more ^{storage} room for his food. If his food is all raised on the place it will need about 4 acres, plus a lot of time for gathering hay & grain & plowing etc. Farm horse costs about \$200.

Better to pay \$525 for a Rototiller, I think. Its life is as long as the horse's. For me, I think, the cost of gas would be less than cost of food. The maintenance & repair cost might be a little higher. I could use it for mowing & pumping, which horse could not do. The interest charge would be a little higher, the depreciation charge a little less.

the speed^{a complete} of work much greater. Could use horse to drag things, - wood, cut, etc, but that is perhaps not so essential. Would have to loan the horse, but need not loan the Rototiller.

For vegetable work, early & rapid plowing counts a great deal. Three days earlier seed into the ground will give me an advantage over others in prices of quite a little. Cumulatively, over years, that is an advantage to reputation, to be ahead of others. Cuts down insect damage, hail damage, & draught risk. The sooner there is a carpet of shade over the ground, the more water^{loss by} evaporation is prevented.

If I can redeem other people's land from quick grass, I ~~will get good prices~~ will have good demand for my services. The time I would have to use on daily

care of the horse I can put to better
use in weaving, etc.

Dr. Walter Gardner Kendall, an
authority on grapes in N. E.

"If one has room for only one grapevine,
the Niagara, a white, hardy, self-fertile
variety, is the one that I would recommend.
Niagara has large clusters. The grapes
are sweet, of delicious flavor, and like
most of our native hardy grapes, very
fragrant. One can make no mistake
in planting Niagara. If you have
room for a second grapevine, Worden
is in my opinion, the best black, but
it is decidedly a grape for an amateur
to grow in his own garden, for the
skin of this variety is so tender
that it does not hold up particularly

will in the market. --- People make a great mistake in thinking that they need a tremendous amount of room for grapes, for it is then our fault if they allow their grape vines to run wild and take up an unreasonable amount of room.

"3) / you are to have two grape vines, grow one Niagara and one Warden. And if you have room for three, plant a Brighton, thus giving you a white grape, a black grape and a red one, for Brighton is a beautiful red grape early enough so that it produces the crop before frost and produces ~~the~~ large clusters that are as sweet as water and beautiful in appearance. I might add that you should not plant the variety Brighton by itself. Niagara and Warden are self-fertile varieties which can be planted by themselves,

but Brighton requires the attention of
the grower in order that its
flowers may be properly pollinated.
The earliest white grape is of the variety
Green Mountain, Ontario being in
my opinion, the best of the group.
Among the red grapes you will not go
wrong if you plant Concord, a variety
similar to Brighton, and a very
strong grower. Salem is another
perfectly splendid red grape, and the
same may be said of the variety
Agawam. Think of Niagara when
you think of a white grape, that you
can successfully grow. Think of
Warden as the best of all the black
grapes, better in every way than
Concord, its parent, and think of
Brighton, of Concord, and of Salem for

red varieties, Brighton and Cass being reasonably early and Salem being a late variety.

✓ "French Intensive Gardening on Money Making Times" - by A. J. Macself, Editor of 'Amateur Gardening' - with illustrations & diagrams. 1932. 7s. 6d. Tinslow & Hanson, London.

Margineff - "Water Relations in Plant Physiology"

If we have to go on a barter idea, the work to be done, the things to be raised, the equipment to be ^{acquired} ~~produced~~, will be determined not so much by their money price as by exchange consumer ^{and producer} value in the neighborhood. Will not reason

interest but will require depreciation.

From this point of view a rototiller would be a more useful tool than a plow & harrow combined with a horse. Since I am not going in for bulky crops, the horse for hauling is not so important. Also I plan to be not far away from market. Of my Norwegian friend in Wisconsin who wheel-barrow.

Why not raise holly & mistletoe for sale? Also medicinal plants & berries?

~~How~~ Raise fish in artificial & natural pond.

L.L. Olds Seed Co., Madison, Ws. flowers & vegetables. seed grains. They sell for one dollar ^{125¢}

a test for acid soil called Saultex ^{1st soil} soil
 will make 75 to 100 tests also flex seed 25th 1/2 lb

Gage leaves are edible. Geckles & Syms
 eat them.

To grow seedless & dentless spinach,
 grow it in wet moss ~~with~~ ^{on} or ^{of} a
 floating raft with "food pills" in
 the water.

Bureaus & Divisions of U.S. Dept of Agriculture

Office of Information
 Office of Experiment Stations
 Agricultural Extension Service
 Weather Bureau
 Bureau of Animal Industry
 Bureau of Dairy Industry
 Bureau of Plant Industry
 Forest Service
 Bureau of Chemistry & Soils
 Bureau of Entomology
 Bureau of Biological Survey
 Bureau of Public Roads
 Bureau of Agricultural Economics
 Bureau of Home Economics
 Bureau of Plant Quarantine

Food & Drug Administration
 Grain Futures Administration
 Bureau of Agricultural
 Engineering

ADVISES ON SOIL TESTS.

Agriculturist Says Holes Give Clue to Good Orchard Sites.

Bore a hole in the ground and watch the water level during April, May and June before making a final decision to plant an apple orchard on a prospective site, Joseph Oskamp of the New York State College of Agriculture, advises in a bulletin from Ithaca. The holes, he says, give two important clues as to the suitability of the soil to grow a profitable fruit crop. Some soils will grow trees but not profitable crops, he warns.

It is a common experience to find water rising in a post hole within a half hour after the hole is dug. The water rises to a point where it remains stationary, and may remain at the same point for days or weeks. The temporary water table is called ground water. Professor Oskamp recommends the boring of holes four feet deep with an inch-and-a-half auger. The test wells should be protected against surface run-in and should be well

distributed over the prospective site. Well-drained soils have little ground water in the surface four feet; the level varies in imperfectly drained soils from one to three feet, while the poorest drained soils are usually water-logged within nine to eighteen inches of the surface.

A quicker way to examine such soils is to study the soil make-up as borings are made. If the surface four feet is of a uniform color, usually some shade of brown, and has no sharply defined changes, the indications point to a good orchard soil. Such soils are generally loams or sandy loams. Where the water has been slow to drain, the subsoil is spotted or mottled, and the more gray mottling present the poorer the drainage. Rusty iron-colored nodules, about the size of a grain of wheat, are further evidence of poor drainage. Fields containing more than a small proportion of such soils are unsatisfactory for fruit.

THE WEATHER

WASHINGTON, D. C., Jan. 25 (AP).—The disturbance that was central over Arkansas Tuesday night has advanced to Eastern Virginia.

Willow and elm

leaves make

alkaline leaf mold;

pine needles make

acid mold, and

oak leaves make

mildly acid mold.

"Sow peas and beans in the wane of the moon

"Who sows them sooner, he sows them too soon."

I might quick-freeze certain vegetables with dry ice, or seal some in CO_2 & ship them by mail, developing a certain group of customers in cities. O. I

might ~~make~~ put together the vegetable parts of a balanced meal (for 2, or for 4 or for 6 people) and sell that as a packaged unit, with or without instructions as to cooking. Might work up special vegetables for sick children, for school children, for hospitals, for dietetics, or for special hospitals. Or a package known as ~~a~~ "4 Temper", Or a "Kitchenette Supper", varied of to season, or a series of them numbered.

To cut down frost losses, could I work out some air drainage or air movement scheme that would work automatically, Cf. French thing to absorb sun heat. How about chromium plated sheets? ~~Spill~~ Drainage should minimize risk of flooding or waterlogging from unusual rains.

The Backyard Garden by Edw. L.
Fairington of Mass. Agric. College.
Stratford Publ. Co. 1932. Good.

~~But~~ Notes from "The Herb Garden" by
Francis A. Bardenwell, A & C Black, London.
1911.

Sage makes excellent tea, of which the
Chinese are very fond. Sage grows everywhere.

Aprons of Mint (p. 74) ~~As a rule~~ "It is
remarkable that such water-loving plants as
Mint should be aromatic. As a rule, aromatic
plants belong to hot, dry places. The essential
oil in their leaves," ^{over} Professor Tyndall tells us,
to protect them from the intense heat of the
sun; the passage of the heat rays is
hindered. The late Professor made a series of
experiments, too, as to the absorption of heat
by odorous vapours. Air scented with

gitchouli had thirty times the cooling effect
of fresh air, and casia had actually
one hundred and nine times the effect.

Do we not all know how a spray of perfume
diffused about a room will cool it! Now
here, when resting in some leafy Peppermint
scented hammocks on a hot day, must have
noted what a cooling, refreshing influence is
somehow spread around.

[Use this by having some mints planted near
the verandah or perhaps in pots to be in the
house during the summer. Also if the
mint hinders the passage of heat rays (!) then
perhaps some such plants in the garden would
help to keep away frost by preventing the
dissipation of heat from the ground on cold
nights. Try it]

p. 15. Pennyroyal. " Trails of it, dried and
thrown by handfuls into stagnant water,

were improved to sniff and make it fit
for drinking. Sailors, therefore, were glad
to buy the Herb and use it when at sea.

In hot countries Pennyroyal is thought
to be a good protection from mosquitoes,
and the royal way it keeps off other
insects is responsible for its Latin name,
Mentha Pulegiens. -- In Sicily it is
hung on Fig-trees to prevent the Figs
from falling before they are ripe."

[If incensed pennyroyal keeps off
mosquitoes or other insects, leave some in
^{to make it easier to cook than}
the garden, & near the porch & in pots
on the porch. Try it].

Rue has a clean & wholesome bitter
milk. Soft bluish green leaves. Said to
keep fleas away. Always considered to have
great purifying powers as a physic for
people, cattle & poultry.

"Camomile is an invaluable substitute for grass in arid places - a dry bank for instance. The colour of its green is vivid and beautiful, quite as fine to look on as the grass of a lawn." When first planted it seems discouraged, but soon recovers and spreads fast.

"There is one remarkable property about the Camomile which some still believe in implicitly - that it is the plants' physician. Nothing is thought to keep a garden so healthy as plenty of Camomile about: it will even revive drooping and sickly plants if placed near them. Some of our villagers, in spite of having let the Camomile die out of their gardens, declare that their parents considered Camomile the best medicine they had.

Saffron (Crocus Sativus) gives a lovely
rich yellow dye. The pollen.

Bergamot (see balm) crimson
flowers. Oil of Bergamot used in perfumery.

Southernwood (old name or Suck's Sore),
has a strong heavy scent. "The smell of
the Southernwood keeps off moths, — so
the French say, and call it Garde-robe."
[If so try, ~~it to keep away~~ planting it
among cabbages & corn to keep away
cabbage worms & com-borers.]

"Balm is one of the most sweetly-smelling
of all the Herbs in the garden". "Delicious
citron scent."

Flowers of mullien might make a
good yellow dye.

p. 26 Old fashioned herbals counsel the sowing
of all seeds while the moon is waxing, not waning
we follow this advice, which may account for our
seedlings doing so well!

Perennial Herbs

- Balm - *Melissa officinalis* - Fragrant leaves. ^{Useful for colds.}
- Bergamot - Bee Balm - *Monarda fistulosa*.
- Camomile - *Anthemis nobilis*
- Chives - - Eat only leaves, not the bulbs. ^{is treated like onion. Salads.}
- Savender - *Savandula*. Herb.
- Marjoram - ^{not herb.} *Origanum onites*.
- Mints - many varieties - *Mentha*.
- Pennyroyal - *Mentha pulegium*
- Rosemary
- Rue - *Ruta graveolens*
- Sage - *Salvia officinalis*. ^{both purple & green minty}
- Savory - *Satureia montana*
- Southernwood - *Artemisia Absolamum*
- Thyme - *Thymus*

Herbs grown from seed.

- Basil (sweet green) *Ocimum Basilicum* } Pot
- Basil (dark green) *Ocimum minimum* }

Chenil - Scandix cerefolium - pot herb.

Majoram (purs.) - Origani Majorana - Pot
Parsley

Rampion - a winter salad - both roots & leaves are eaten.
Campanula rapunculoides.

Senny yare or Spoonwort - *Cochlearia officinalis* -
One of the most effective antiscorbutic plants
known.

Mints keep milk from curdling. Help
to digest meat.

Wholesale Chemicals, Boston.

Howe & French, Inc., 101 Broad St

Dewey & Albany Chemical Co., 235 Hawley St.
Cambridge.

General Chemical Co., 543 Commercial St
Boston.

In "The Fragrant Path" by Louise Barber
 W. Elder - Macmillan, N.Y. 1932 ^{has the fullest list of}
 fragrant plants & flowers I have seen

it is said that Rosemary gives out its scent
 in hot sunshine, without being touched or
 crushed, and that the odor keeps away
moths. The odor of its flowers is different
 from the leaves, & is very free upon the air.
 rarely raised from seed. "North of the Carolinas
 it must grow in a pot."

~~see Francis Barlowell~~ - "The Herb
 garden" Pennyroyal gives off its scent to
 the air as it grows.

Apple mint has a lovely scent. This &
 Spearmint are the best of the mints. All mints
 like moisture.

All the Marjorams are easily grown from
 seed.

Wormwood is said to keep moths away.

R. Vincent, Jr., & Sons Co. of Whitman,
Md. has many kinds of sweet scented
geraniums & perhaps other herbs.

Donald Mc Donald's "Fragrant Flowers &
Seeds".

^(Ruta graveolens)
A few sprigs of Rue, hung in the
room will drive out flies.

N.B. as
keeping insects
flies from
room.

The leaves of Dwarf elder (*Sambucus
elaeagnus*) will drive mice away from
garages

1- The Fragrant Poth the
pungent smell of Nasturtium is
resembled by that of Marigold,
Calendula, Chrysanthemum, and Tansy.
Athenasias, Fennel and Rue.
Calendula used to be called Pot Marigold

Invigorating and health giving odors
are said to come from such, Basil,
Sweet Marjoram, Violets, Rosemary,
Mint, Wild Thyme, white lilac,
clove Pinks. Sandal, old Rose.

Other sweet odors are Geranium, gilli-
flower, Stock, Wallflower, white Violet,

Sweet scented foliage plants - apple mint,
basil, bay, bergamot, lavender, lemon
geranium (tender), lemon verbena (tender),
micromeria, old woman, orange mint,
rose geranium (tender), Rosemary (tender),
southernwood, sweet marjoram, thyme.

Mignonette is more fragrant when
grown in a poor soil. It loves lime. Its
scent is strongest when sun is strong.

Most fragrant varieties of sweet pea
are Purples - Royal Purple & Purple Pea-

fection. Maroon, - Warrior & the Sultan.
name, - King name, name Beauty.
Blue (light), Blue butterfly, Heavenly Blue,
Mrs T or Jones and Blue Bird (dark),
Commander Codal and Jack Cornwall, V.C.
Crimson - Sybil Henshaw, Charity, and
Harris's Crimson. Rose - Sunset,
Empire and Private Jack Smellie.
Carmine, - Renown and Marshall's
Dugan. Pink, - Belle and Miss
Philadelphia.

Just as there is the business of
specialising on baby chicks, so in
vegetable work there is the business of
raising seedlings for gardeners, - cabbages,
cauliflowers, tomatoes, egg plant, etc. It
need not require much glass. Probably
a demand ~~will~~ partly in early spring, and at

several later stages.

For my plan to ~~put seeds~~ glue seeds to a string preliminary to planting, so as to get distances correct, instead of using string, ^{paper} ~~easy~~ ribbon, confetti. The paper would quickly rot, - much more quickly than string, - and by putting it in edgewise you could have depth of planting uniform throughout.

Get the name of the supply house that ^{makes a} ~~specialty~~ for ^{for} vegetables, as in Cranston store.

The paper ribbon confetti idea will enable the planting to be done quickly; perhaps no need even to make troughs for seeds, - just shove the ribbon into the

ground likewise. Also can get the
seeds all ~~strong~~ glued on the ribbon
during the winter when there is
nothing else to do. Could also,
tho not so easily, use it for
alternate plantings, i.e. leave
certain places vacant on the
ribbon & either tick other kinds
of seeds in those blank spaces or
sow them in.

ch. XI

p. 230

Quote from "Fanners of Forty Centuries"
" The customs and practices of
these farthest Eastern people in their man-
ufacture of fertilizers in the form of
earth composts for their fields, and
in their use of altered manure which
have spread in their hangings, village
walls and dwellings, are all instances

in which they profoundly shorten the time required in the field to effect the necessary chemical, physical and biological reactions. Not only do they thus increase their time assets, but they add, in effect, to their land area by producing these changes outside their fields, at the same time giving their crops the immediately active soil products.

---- "Western agriculturists have not sufficiently appreciated the fact that the most rapid growth of plant food substances in the soil cannot occur at the same time and place with the most rapid crop increase, because both processes draw upon the available soil moisture, soil air and soluble potassium, calcium, phosphorus

in and nitrogen compounds". Whether
this 220-221. ~~the compound~~ put

23. "They (the Chinese) have long realized that
much time is required to transform organic
matter into forms available for plant
food, and, although they are the
hardest workers in the world, the
largest portion of this organic matter is
pre-fermented with soil or subsoil before
it is applied to their fields. This is at
an enormous cost of human time and
labour, but it practically lengthens
their growing season and enables them
to adopt a system of multiple crop-
ping to which would not otherwise
be possible."

105. "In the preparation of composts, pits
are dug near the margin of the reservoir,
as seen in this illustration, and into them

are thrown coarse manure and any roughage
in the form of other refuse that may be
made available, these material being
saturated with the soft mud dipped from
the bottom of the reservoir;

220-221 "The ~~compost pit~~ In the ~~compost~~
pit " had been placed all the manure
and waste of the household and street, all
stubble and waste roughage from the
field, all ashes not to be applied direct-
ly, and some of the rail stacked in
the street. Sufficient water was added
at intervals to keep the contents com-
pletely saturated and nearly submerged,
the object being to control the character of
fermentation taking place.

"The capacity of these compost pits is
determined by the amount of land
served, and the period of composting is

made as long as possible, the aim being to have the fibre of all organic material completely broken down, the result being a product of the consistency of mortar.

"When it is near the time for applying the compost to the fields, or of feeding it to the crop, the fermented product is removed in waterproof carrying buckets to the floor of the court, to the yard, or to the street, where it is spread to dry, to be mixed with fresh soil, horse ashes, and repeatedly turned and stirred to bring about complete aeration and to hasten the process of nitrification. During all these treatments, whether in the compost pit or on the nitrification floor, the fermenting organic matter in

contact with the soil is converting
plant food elements into soluble plant
food substances in the form of potassium,
calcium and magnesium nitrates and
soluble phosphates of one or another
form, perhaps of the same bases and
possibly others of organic type. If
there is time and favorable temperature
and moisture conditions for these
fermentations to take place in the
soil of the field before the crop will
need it, the compost may be carried
direct from the pit to the field and
spread broadcast, to be ploughed under.
Otherwise the material is worked and
reworked, with more water added if
necessary, until it becomes a rich
complete fertilizer, allowed to become
dry and then finely pulverized.

sometimes using stone rollers drawn over
it by cattle, the donkey or by hand."

With ~~this~~ this plan I can use part of
my acreage for growing clover, soy beans,
alfalfa or other strongly nitrogenous
crops. plus perhaps other straw crops in
winter (e.g. rye); compost this material
with stone meal, feathers or ^{chicken droppings} excrements
from duck place, ashes, garbage & a
little cow manure; and use the
compost in my concentrated $\frac{1}{4}$ acre
garden. This immediately available
& soluble plant food will enable me
to raise early crops and large crops,
thus getting benefit of early prices, and
~~the & they method will~~ minimizing
dangers of insects attacks and blights.
Using it in the hot bed will enable

steamer and started back to the harbor in pitch darkness. He felt
me to get large & vigorous seedlings for transplanting earlier than other people.

The 3 story method will cut down labor on hot days & allow me to use that time for selling. Also will make vegetables more perfect looking & thus enable me to get better prices. In late autumn when crop work is relatively less, I can use my time cutting the grasses etc for compost and in making compost heaps. Also in plowing soil to use in such pits.

The Rototiller with attachments would give me a cutter for grasses, a splendid & quick way to mix compost material with soil in the field and an extra source of income.

Have a cement mixing floor, a Chinese style wheel-barrow with weight over the axle

& a wide tread, large-diameter wheel for carrying soil and compost material & straw to & fro from field. ^{Probably} ~~Perhaps~~ a two wheeled ^{push} cart would be best, - wide tires & large diameter.

~~thing~~ I can buy hay, ^{straw,} ^{winds,} garbage, dead leaves in autumn, and other compost material. Perhaps better ^{process} ~~it~~ with chemicals similar to Adco.

This plan concentrates my intensive labor in the $\frac{1}{4}$ acre garden & yet uses sunshine, ^{continuously} on all the rest of the land. Saves weeding labor, cultivation labor, watering. Have say 2 apple trees, one pear, ~~one nut tree~~ ^{one nut tree}, some domesticated blue berry shrubs ^{grapes} & a few raspberries. ^{Several} ~~One~~ bean trees for shade & for goat or compost use. ~~For~~ For conversion of songfuge have a few chickens and a

goat. ~~The goat~~ If necessary for carrying, a donkey would probably be much cheaper than a horse. Goat might do a little hauling on the farm.

Grow potatoes Maori style. Also melons, cucumbers and squash.

Hauling to market by motor. Motor plow & tillage.

Fish tanks would help in the general conversion process & provide other food proteins.

~~Try raising Jerusalem artichokes as well as potatoes for storable starches.~~

The compost method, as indicated in the quotes, reduces the acreage needed as compared with Western agriculture, first by doing away with much of need for cattle to make manure, & thus eliminating that waste, also through

intercropping and companion cropping,
doing away with need for letting fields
lie fallow. Ross method aids in
this respect also.

By adding to Chinese methods the
(which include both the advantages of
Ross and of composting) the Western
facilities of glass hot & cold frames,
motor plowing, ^{selected seeds,} tillage and traction,
plus water pipes and tile drainage,
I ought to do as well as the Chinese
^{off a small acreage}
with considerably less labor.

How would it be to puddle the soil
of small fields in which certain plants
are grown & then transplant seedlings
from nursery bed, as the Chinese do
with rice? Keep it flooded till
plants are high enough to back the

ground. Then drain & let go.

Rather than get a horse, have a 4-wheeled cart which can be hitched to the motor car, and use that to haul hay or similar large loads. Also a 2-wheeled trailer for taking vegetables to market.

In transplanting, e.g. cabbage, seedlings from flats to fields, try soaking the flats in water so that the bare rootlets will not be destroyed in the transplanting, & putting them in with mud, mudding & afterward.

I can get ~~the~~ duck entrails and feathers for composting from the duck farm at Framingham Centre.

The Rototiller would help greatly in
trenching to bury extruded feathers, &
thus be helpful in enriching the soil,
and this value should be counted in on
any estimate of whether it saves its keep.
Could it be rigged with a scarp to move earth
~~down~~

Put iron sulfate solution into earth
around roots of roses & grape vines
to kill the worms which breed into
rose beetle which eats rose & grape
leaves so badly.

Unscated paper make good raime.

1 hedge shrub at the Johnsons, Framingham,
Mass. is 'Aurelia Pentafolia'.

He felt a pitch darkness back to the

trying in water will and loss of N.

When I come to work out best ways of making compost I must learn just how long to leave it so as to get the maximum amount of Nitrogen, as after it reaches the maximum it begins to lose it if left in the heap, *cf.* to Howard. Should promptly be spread on the ground to arrest the loss of N. Can test it at various stages by growing some leafy plants in ^{in pots} samples of it, at various stages & then photographing the plants & comparing the photos. Not only the length of time of fermentation should be noted, but the ~~the~~ air temperature & moisture during the period. Can control the amt of water put in the compost, & the mixture of materials. Note the color, texture, temperature, etc of the compost when taken for the test.

Protect garden from thieves by
red-ray photo, ^{etc.} cell devices which turn
on flood lights and ring bells, &
perhaps shoot off blank cartridges.

Gardening with Herbs. by
Helen Mougnttan Fox -
Macmillan 1933.

For wheels & axle for a farm push cart
or trailer, get some from an auto wrecking
co. or junk place.

Can make & sell spiced grape juice
à la Hazel's recipe. Try raspberry juice &
blackberry juice also.

Tyler Sales Fixture Co, Muskegon Heights,
Mich., makes sprinklers for vegetable stands

A farmer must do a lot of heavy work and
expense for manure, especially market gardeners.
∴ Composting labor is probably no greater and is
definitely more effective in many ways.

Manure

1. cleaning out of barn, daily
2. Loading spreaders
3. Spreading

Source of nitrogen; also those
due to weed seeds; fly
nuisance; less effect in
field

Composting

1. making the heaps
2. Turning it (times)
3. ~~Spreading~~ it.
4. Spreading

It will ~~spread~~ ^{spread} food and
spread more easily and evenly
because its composition is ~~more~~
more uniform, less lumpy and
more friable. No fly nuisance,
much fewer or no weed seeds, less
plant disease, quicker growth of plants,
∴ less insect ~~pests~~, less spraying, less
insects later because of more vigorous plants &
fruit ripened sooner, less weeds also because
quick growth of plants choke them off.

In both instances hay must be cut, so that labor is
at least same for both. Probably less for compost because
weed not must for curing of hay and no loss because of rain.
Loading damp grass this, would be harder than cured hay.

But daily labor of cleaning cow stalls is much greater in work &
time than making the compost heaps and spreading them. Satter
is more concentrated in time. Also a great saving in the
of labor in the reduction of weeding and spraying. Fewer
defects in fruit will make for ease of selling and higher
prices and better reputation.

Home Service Bureau
5607 Meredith Bldg

Des Moines Iowa. A part of
"Better Homes & Gardens"

1714 Grant St. Des Moines

Sept 17 33 Cephlets 44 each.

Garden Hints

B-G-11 "How to have Continuous Bloom in the
Perennial Garden"

B-G-12. "Herbs and how to grow them"

B-G-14. "Fifty Successful Shrubs to plant in
the Northern States"

I must work up a fairly steady supply of
plant food - compost, to be put on the garden
before sowing and after the plants are up, at
about 3 weeks intervals. Work up lots from
mid summer on, - after heavy work in the
garden is done. This will beat French methods
where manure is used so extensively. Will
enable me to get in more crops, bigger and
healthier fruit, several days ahead of the
market average.

almost

I can raise ^{almost} all our own

Starches :- potatoes, Jerusalem artichokes, corn, peas,
linas, wheat, sweet potatoes(?)

Sugars :- honey, grapes, raisins? ~~berries~~ apples,
~~currants?~~ ^{roghum}, ^{single sugar}
~~peaches, pears, lints,~~

Fruits :- grapes, apples, peaches, pears, blue berries,
raspberries, strawberries,

Proteins :- chickens, eggs, goat's milk, cheese,
soy beans, nuts, perhaps fish.

Vegetables :- root, leafy, blossoms, stems, for roughage,
vitamins, minerals.

Some fats :- in milk, soy beans, nuts, eggs, sunflower seed

Fodder for goats :- hay, sunflowers, soy hay, alfalfa?
bean growing trees, black
mulberry trees, locust
some feed for chickens,
J. Antichshu

I have a theory that both plants and man,
when on wrong diet, when run down or sick,
when chemically unbalanced, give off odors
which attract insects that prey on them.

E.g. mosquitoes with man. Perhaps this is why plant lice and other insects come at plants. Perhaps that is one reason why weeds are relatively free from devastating hordes of pests. Also trees of fungi, etc., I think, and of filterable viruses like mosaic.

Prices may never be so low again.

Garden Digest

—the "garden magazine of all garden magazines"—because it condenses helpful articles of lasting value from scores of magazines. Garden Digest is your private secretary—always watching for the best. Sample, 10 cents. One year, \$1.00.

GARDEN DIGEST, 109-B Great Oak Lane, Pleasantville, N. Y.

To make initial starter for
compost use some well rotted
cow manure & some also
manure

HOMESTEAD HELD BEST INVESTMENT

Ralph Borsodi Writes of His
'Self-Sufficient' Home in
the Country.

RAISES NOTHING TO SELL

People Can Make Two-thirds of
Things They Use Cheaper Than
They Can Buy Them, He Says.

The migration of millions of persons in this country back and forth between city and country is evidence of profound dissatisfaction with living conditions both in the country and in the city, according to Ralph Borsodi, author of "Flight From the City," just published by Harper & Brothers.

In this book the author discusses the so-called "Borsodi experiment" which has attracted wide attention. Some twelve years ago Mr. Borsodi move his family from New York to Suffern, where they established a self-sufficient homestead. The book discusses in detail the small amount of capital involved, the equipment

for gardening, weaving and other domestic production needed, and how to plan and select articles for home manufacture. Mr. Borsodi is the author of "The Distribution Age" and "This Ugly Civilization," to the latter of which the present volume is a sequel. As consulting economist in Dayton, Ohio, the author has been instrumental in the extension of his idea to many families of unemployed.

Raise Nothing to Sell.

"In certain important respects," Mr. Borsodi explains, "our experiment was very different from the ordinary back-to-the-land adventure. We quickly abandoned all efforts to raise anything to sell. After the first year, during which we raised some poultry for the market, this became an inviolable principle. We produced only for our own consumption. If we found it difficult to consume or give away any surplus, we cut down our production of that particular thing and devoted the time to producing something else which we were then buying.

"We used machinery wherever we could," the author continues, "and tried to apply the most approved scientific methods to small-scale production."

This led to the discovery, Mr. Borsodi writes, that "more than two-thirds of the things which the average family now buys could be produced more economically at home than they could be bought factory made; that the average man and woman could earn more by producing at home than by working for money in an office or factory and that, therefore, the less time they spent working away from home and the more time they spent working at home, the better off they would be."

The Home as an Investment. . .

Finally, Mr. Borsodi discovered, "that the home itself was still capable of being made into a productive and creative institution and that an investment in a homestead equipped with efficient domestic machinery would yield larger returns per dollar of investment than investments in insurance, in mortgages, in stocks and bonds."

In Dayton, Ohio, for nearly a year a sociological experiment of far-reaching significance has been under way, Mr. Borsodi points out. "In this industrial city the support of the Council of Social Agencies has been given to an organized movement based upon production for us (as contrasted with production for the market), and for homesteading with domestic production, as described in this book. As con-

sulting economist for the Dayton movement, it has been my privilege to watch a development which promises, because of the interest other cities are taking in it, to make social history."

Borsodi's idea of not making to sell is O.K. for him because his marketing & economic reputation give him a commodity which has higher prices at less labor & with more interest for him. Also he has not had farm training or experience. His plan is based on his wife's home abilities & desire to work there.

With wife, it is the wife who has the other & better earning capacity. ∴ I shall spend all my time on the farm & thus can & should try to make income off it. Borsodi's plan presumes the full continuation of capitalistic industrialism.

or by essential oils which break up on the death
of the plant. Or the oils may attract parasites of
the destructive insects.

The investigation by U.S. Dept. of Agric
of plants having insecticidal proper-
ties is not decisive in relation to compo-
sition insecticidal plants because all the
tests were made ^{by} of extracts of dead plants,
whereas ~~it~~ it is possible that part of
the killing ^{or repulsive} effect might be due to
mitogenetic rays given off only by
live plants. So that list may be
and only as containing suggestions.

It might be possible to dry grapes
which have thick skins, after the skins have
been taken off, making a sort of raisin
paste which would keep fairly well.
This, ^{if successful,} would make possible a fine winter
food.

By preserving fruits with honey & drying
some, I could carry fruits through the

year.
"Culinary Herbs & Condiments" by Mrs. M.
Grieve, Harcourt, 1934, \$2.00

Feb 12, 1934.

Birds Vs. Insects.

The wise gardener is not impelled by sentiment alone when he does everything within his power to attract birds to his small domain. Observation soon teaches that the greater the number of birds the less trouble there will be from insects.

Few gardeners, however, take advantage of the simplest of all ways of encouraging bird visitors. This is to leave a few dense thickets in the shrubbery where the nest-makers will find congenial conditions. Why build elaborate—and usually unattractive—bird houses

when fewer than a dozen species ever make use of them?

Practically all birds mate very early in the Spring. Gardeners who are also nature students, when doing their pruning at this time of the year, take pains to leave places where the feathered home-builders will settle down to rearing families. A tangle of honeysuckle in some out-of-the-way corner is ideal for this purpose.

Permanent trees, shrubs & vines to have at S. Natick.

Apple trees ⁽³⁾ - Mainstock,
Graustein
Russet, Baldwin, (one each)
Winthrop

Honey Suckle 1 or 2 (for good food

& N for nectar)

Raspberries, about 20

Grape vines, about 10, of

3 or more varieties

Pear tree, 1, Bosc

Peach 2 or 3

Honeysuckle vine for birds

Holly tree (4), perhaps 1 pecan & 1 persimmon
walnut. Domesticated cherry,

At Matsubara ~~was~~ on some of cement barn floor
build a rim of cement and make a little
pool for water cress & to grow plants, ^{especially spinach,} with
chemical pills in water, 'a la Kashmiri method'.
Try darkening the water with some dye
to increase heat absorption. Use reflectors
on N side of ~~high~~ pools made of well board
covered with ~~sheet~~ aluminium foil.

Such reflectors on N sides of garden
beds would act also as wind breaks, and
perhaps the extra heat and protection
would be almost as good as a cold
frame for starting plants early. Try.

Make another tank for fish & another
for wet composting - to rot the shells etc.

Tools to get 1934, for Natich.

shovel, pick, crowbar, spading fork, 1 wide hoe,
1 narrow hoe, 1 wide rake, 1 narrow rake, 1 large
& 1 small trowel, heavy long clippers for hedges,
1 scythe, 1 wooden rake, pitchfork for handling grass or
compost, spade, sledge.

Try experiments on root pruning to control
time of bearing, also side on which the
plant will bear.

Get grape vines from B. S. Hubbard &
Piedmont, N. Y.

They make jelly flavored with mint, - why not
flavor it with other herbs, - marjoram or catnip
sage, etc.²

Vegetable seeds for Natick

black peas 44	nasturtium 93 climbing & red
limas 7	sweet peas 61
	<u>Herbs</u>
radish 50	geranium
beets 15	camomile
okra 41	
lettuce 37	Southernwood
golden bantam corn 29	wormwood
carrots 24	Rosemary
parsnips 44	calliopsis 17
turnips 37	
spinach 53	Grapes, Niagara, Warden,
salad 34	Brighton, Salem.
~~celery~~	
string beans 74	
Swiss chard 33	
wax beans 12	
melon 38	
cucumbers 25	54
squash (summer)	calliopsis 17
soybean 143	Brassica
J. antiholus	
get tomato & egg plant	
cablage plants, & pepper plants.	
asparagus 6	

Bumper 1934

kind	Catalog #	Quantity	Price	kind	Catalog #	Quantity	Price
¹⁶ pars, bush	Radio 732 (EE)	$\frac{1}{2}$ #	.25	¹⁴ parsley	717	plt	.10
⁴ limas	95	plt	.15	⁶ Carli- flower	244	plt	.15
⁴ str. beans	98	plt	.15	¹ asparagus	9951	50	1.25
⁷ wax beans	33 (bush)	plt	.15	Total			4.65
¹⁷ redish	886	plt	.10				
³ bush	938	plt	.10				
¹³ oliva	115	oz	.15	nasturtium			
¹¹ lettuce	661	plt	.10	vine	3168	plt	.10
⁹ corn	469	plt	.10	Ditto			
	475	plt	.10	bush	2354	plt	.10
				must peas	3598	plt	.25
							.45
	301	$\frac{1}{2}$ #	.25				
	218	or plt	.10				
carrots	225	or plt	.10	plants			
¹⁵ parsnips	725	plt	.10	cabbage			
⁷ cabbage	115 127 129	plt	.10	tomato			
turnip	991	plt	.10	egg pl.			
¹⁴ spinach	1501	plt	.05	pepper			
¹⁵ salify	983	plt	.10	wormwood			
²¹ chard	137	plt	.10	haric	plt	.12	
¹⁰ cucumbers	7006	plt	.20				
²⁰ squash (5)	1018	plt	.10				
¹² melon	7066	plt	.20				

First lot of seeds from bumper 1934, \$3.65

If beans & soy beans are sprouted & dry baked before cooking, the starch is changed over to maltose & dextrose & then does not make a bad digestive combination with the protein.

Peggy Norton says to plant flax along with potatoes to keep away potato bugs. From an old label. It works for them Norton, 1934

Flax = Linum usitatissimum

axe 1.89

grass
beans .95

hickory 1.29

pitchfork 1.65

Expenditures for Garden 1934

Wheelbarrow	Oct 1933	4.95
Seeds, 1st lot, mostly vegetables.		~~\$~~ 3.65
rake —	Mar.	.69
trowels 2, & hand weeder	Mar.	.19
hammer	Mar	.59
spading fork	Mar.	~~1.49~~ .59
50' garden hose	April 2	3.98
long handled shovel	April 2	1.50
pile mattocks & handle	April 2	1.75
short handled shovel	Mar 30	1.29
heavy clippers	Mar 30	1.49
crowbar	Mar 29	1.65
pail	April 2	.27
hoe		.55
~~\$~~ 1.35		
sledge, handle & wedge		1.85
spade		1.59
grass scythe & swath		2.64
sickle		.65
sharpening stone (whetstone)		.19
blow torch		1.00

The Handy Hoe, Southington, Conn.

Wonder Weeder, Orange, Mass. 25¢ ^{1/2} 1

Bural New York 333 W. 30th St N.Y.C.

Euphorbia - red gray flower.

A mixture of glycerine & starch will keep hands in good condition after much weeding, etc. Use after weeding & before drying the hands.

For all plants that fruit above the ground, plant under a rising moon. Rain water collected in that half of the moon is best. Plant nasturtium among apple trees. Horn radish by potatoes, kept in

bound by - trend of pig manure, improves
the flavor of both.

Desirable tools for the country

Garden : Spade, ^{shovel} wooden rake, metal rake,
hoe, strainers, stout clippers, pick
axe, mattock, crow bar, wheelbarrow,
hose, watering pot, lawn mower (!)
spading fork, two wheel plow

Carpentry : A good hammer, hatchet,
cross-cut saw, heavy screw driver,
ratchet screw driver, brace & several bits,
gimlet, square, level, plane,
automatic drill, jiggers, chisels of
several widths, axe, work bench,
pot of glue, vice, small bottle of
shellac, nails & screws.

Glazing : box of glazier points, 12 panes of
glass the size of windows, 1 pt

linseed oil, whitening, putty knife.

General: Buck saw, good sized bucket,
child's express cart, mouse trap,
cage rat traps, piece of garden
hose for syphoning.

London Times Jan 16, 1933. Sir John
Russell ^{in book on} "The Farm & the Nation"
says that modern transportation has
killed the old plan of producing every-
thing on the farm. He small hold-
ings he says that they are too small
for the full working of machinery
so the small-holder has to spend
longer hours than the corresponding
worker on the large farm in order to
obtain the same output on the
same wages. He is at liberty to do
so, but he cannot get workers to

Many questions multiply in
the evening.

work longer than they do on the big farms and at the same higher wage rate fixed for big farms." & That is true if the small-holder tries to sell outside his own locality or does not adapt his work properly. >

~~And~~ —————

An old English book on gardening says that by cutting off a heavily fruiting bean or pea when they begin to blossom they throw out more branches and bear later much better than if they were planted later because their roots are well set before the dry time comes.

"If you cut off the stalks of your beans near the ground when they are first ripe, the roots will spring again and in reasonable years you

may have a second crop about
Michaelmas."

"From whence we may conclude
that if you cut off your beams that
are set in the spring, at such times
as they begin to blow, then they
will germinate again into more
branches and bear late, much better
than if they were planted late, which
extreme drought usually hinders
from coming to perfection."

Re melons it says "Place a tile
under each melon; it lie the
warmer side upon it, and nip off
the small shoots that expand the
top from the more leading branches
when your melons are as big as
tennis balls then nip off the
shoots at some distance beyond

them at a joint. And the melons will grow large.

When you cut them off leave a little stalk attached to preserve them longer.

"Preserve the seeds of those that are most early ripe, and prefer those seeds that lodged at the sunny side of the melon.

Cucumbers are more tasty if not watered too much, tho not so large.

It says the newly topped shoots of eldes are good eating. Also the ordinary buds of eldes and the red young tops of nettles and of water cresses.

"The green tops of young peas cut off and boiled are reported to be a most delicate dish, greeny whether if they being cut off the remaining

roots will not emit new shoots
and produce a fair crop of later
peas? If they will, then you
may have late peas faster this way
than by following late --

It says that hoofs and horns,
skins, feathers, flesh, bones and
wool rags are excellent fertilizers.
Also shavings of tanned leather. Make
into compost. Good, Bacon
reported "that the bark of white or
red poplar cut small and cast
into furrows well druzged will
cause the ground to put forth
mushrooms at all seasons of the
year fit to be eaten."

He felt a bit dark back to the
Grape Juice of Hazel
ripe but firm
Stem and wash Concord grapes in cold
water. Put into a quart Mason jar
1 1/4 cups grapes and 1/2 cup granulated
sugar. Fill up with boiling water
to overflowing. Cap and seal immedi-
ately. Allow to cool slowly. Set
aside for two weeks before using.

rainy
Try Jerusalem artichokes for starchy
starches for home use, as well as potatoes.

At S. H. house I have planted today
Apr 25, 1934 the following 3 yr old grape
vines along South wall of recent barn ruins
in this order from West to East
2 Brighton (red), 1 Worden, 1 Niagara.
On rock up beyond old barn I planted 1 Niagara.
at fallen wall between barns I planted two
black grapes,

Place racks etc to keep tools. Have racks
to keep bean poles on our winter, in the house.

Cut a lot of tin cans for cut-worm collars

THE HARVEY SOCIETY LECTURES 1932-1933

This new volume presents the twenty-eighth series of the famous Harvey Society Lectures, covering as usual a variety of subjects by high authorities in their respective fields. Edited by Dr. EDGAR STILLMAN. Cloth, $5\frac{1}{4} \times 8$, illustrated. \$4.00. The contents include:

The Constitutional Principle in Clinical Medicine. By JULIUS BAUER (Vienna).

Similarities between Diseases of the Vegetable Kingdom and those of Man and Animals. By L. O. KUNKEL (Princeton).

The Nature of the Menstrual Cycle. By GEORGE W. CORNER (Rochester).

Strip farming, much advocated as a means of slowing down soil erosion, is also valuable as a method of holding in check aphids, or "plant lice." Strip-farming experiments have turned in practically aphid-free strips of peas and cantaloupes interplanted with corn, cotton and other plants, while adjacent solid fields of the same truck crops were destroyed by the insects. The efficacy of this alternate planting is probably due to the shelter and encouragement the strips of other crops given to the natural parasitic and predatory insect enemies of the aphids.

from the
the
would
could
The
ing be
to loca
uncerta
taken.
secured
Samuel
street, 31
Market
the John
street

"Bread & Roses from Stones"

by

can be had for 50¢ from
the Sherry Book Store
815 Third Ave.
Seattle, Washington.

Cracked eggs may be boiled without the contents oozing out if a teaspoonful of salt is added to the water.

RUSSIAN 'BURBANK' SHUFFLES SEASONS

Growing of Subtropical Wheat
in Cold Climate in Practice
on 500,000 Acres.

1,260 VARIETIES IN THE TEST

Dr. Borodin, Here, Tells of Success With Dr. Lyssenko's Method of Treating Seed.

WEAPON AGAINST DROUGHT

Shortening of Growing Period Ripens
"Yarovized" Grain Before Dry
Season Sets In.

The recent discovery by Dr. T. D. Lyssenko, who is known as the Russian Luther Burbank, of a process that permits the growing of subtropical plants in northern climes, and also makes possible the crossing of plants requiring entirely different periods of vegetation, has been placed in operation on a half-million acres of land in Soviet Russia, it was revealed here yesterday by Dr. Dmitry N. Borodin, Russian agronomist and plant physiologist.

Dr. Lyssenko's discovery was first announced to the English-speaking scientific world last August before the sixth International Congress of Genetics at Cornell University by Dr. N. I. Vavilov, director of the Institute of Plant Industry in Leningrad.

The discovery utilizes a new process of treating seeds, called "yarovization," which, literally translated, means "springification"; by means of "yarovization," a term adopted also by the German scientists, winter varieties can be transformed into spring varieties and late varieties into early ones by the action on the seed before sowing of definite combinations of temperature, light, darkness and humidity, artificially inducing processes of fermentation.

The Process Is Simple.

"Yarovization," Dr. Vavilov told the Cornell gathering, involves a relatively simple physiological treatment of the seed before planting and "enables us to utilize in our climate for breeding and genetic work tropical and subtropical varieties, which practically amounts to moving the southern flora northward. This creates the possibility of widening the scope of breeding and genetic work to an unprecedented extent, allowing the crossing of varieties requiring entirely different periods."

"By using an old method of hybridization introduced by Dr. Lev Sapegin in combination with 'yarovization,'" Dr. Borodin said, "the Russian plant breeders are able at present to obtain four to five generations of spring wheat in one year. In other words, the work which required in the past from ten to twelve years may be accomplished now in only three to four years."

Thousands of hectares of "yarovized" winter wheat, Dr. Borodin told, were planted quietly in the steppes of Russia during the Spring of 1930. The results were so encouraging that more than 250,000 acres were allotted the next year.

There are other advantages in the planting of "yarovized" seeds, Dr. Borodin added, in addition to more rapid reproduction and the shortening of the vegetation period. As a direct result of these the crops outspeed the rust and other diseases to which winter wheat is susceptible to a high degree, while the earlier ripening enables Russian crops to be harvested before the period of the drought, which generally comes in Russia late in June.

1,260 Wheat Strains Tested.

About 1,260 pure line varieties of wheat, collected from different parts of Azerbaijan, Trans-Caucasia, as well as varieties of Ukrainian wheat, Dr. Borodin said, were sown on the Odessa experimental acres in April, 1930. Some of these were "yarovized," while others were planted as controls.

"In the group of non-yarovized Ukrainian varieties," he said, "ears started to appear on June 15, and these ears ceased to produce on June 21. At the same time the wheat from Azerbaijan gave only 4 per cent of ears, and on July 1 these varieties comprised only 11 per cent of the ears."

On the other hand, the yarovized group of the Trans-Caucasian varieties showed ears more than two weeks earlier than the Ukrainian. Until the 15th of June, 830 varieties, or 66 per cent of these sub-tropical wheats, grown in moderate climate, produced ears, with a yield in some instances 41 per cent larger than the native product.

"The non-yarovized Caucasian varieties produced no grain, or grains of very poor quality, while the yaro-

vised Caucasian varieties produced excellent grains, far superior to the best Ukrainian varieties. In other words, semi-tropical varieties of wheat, when planted in a moderate climate, after yarovization, surpass the best local varieties not only in yield but also in quality. Special baking tests that were made on the transplanted product showed it to contain considerably higher food values."

The experiments have so far been conducted on wheat, millet, cotton, corn, soybeans, barley, mustard, sudangrass, sorghum, potatoes and grapes, the results being the same in all instances. Each variety, or species, requires its own individual treatment. As the experiments progress more and more varieties will be included," Dr. Borodin said.

NEW EAST AIR LINE TO BE OPEN

Coal Dust Used to Speed Soviet Cotton Production

By Science Service.

MOSCOW, Oct. 2 (By Mail).—

Russian farmers have discovered a way to speed up the ripening of their cotton crops by a month or more. They use coal to warm the cotton plants without burning the coal. This seeming paradox is being performed at Kazakstan, U. S. S. R.

Obtaining heat from coal without burning it is the application of the simple principle that dark colors absorb the heat in the sun's rays better than light colors.

The farmers spread coal dust lightly over their fields; about 100 pounds to the acre. The darkened surface is a better absorber of heat during the day and re-radiates more of it as warmth during the night. The higher average temperature of the land during the growing season shortens the time necessary for the crop to mature.



Times Wide World Photos.

Cabinets in Which Fresh, Green Cattle Fodder Is Grown in 10 Days.
Right—One of the Trays in Which Feed Is Grown Without Earth.

Vegetable 'Gardens' in Kitchens Likely As Cabinet-Grown Fodder Crops Succeed

Sep 9, 1935

Special Correspondence, THE NEW YORK TIMES.

LEISTON, England, Aug. 30.—On the Suffolk farm of Michael Faraday, grandson of the great electrician, scientists have witnessed the first practical results of seventeen years' research into a new method of growing crops which may entirely revolutionize agriculture.

Here, by a special process discovered in Germany by Dr. Paul Spangenberg of Lübeck, crops of maize

and barley are grown in ten days, not in the ground, but in chemically treated trays arranged in tiers inside metal cabinets. These crops are being used daily to feed cattle and pigs on the farm and the animals are in better condition than others fed with ordinary outdoor fodder.

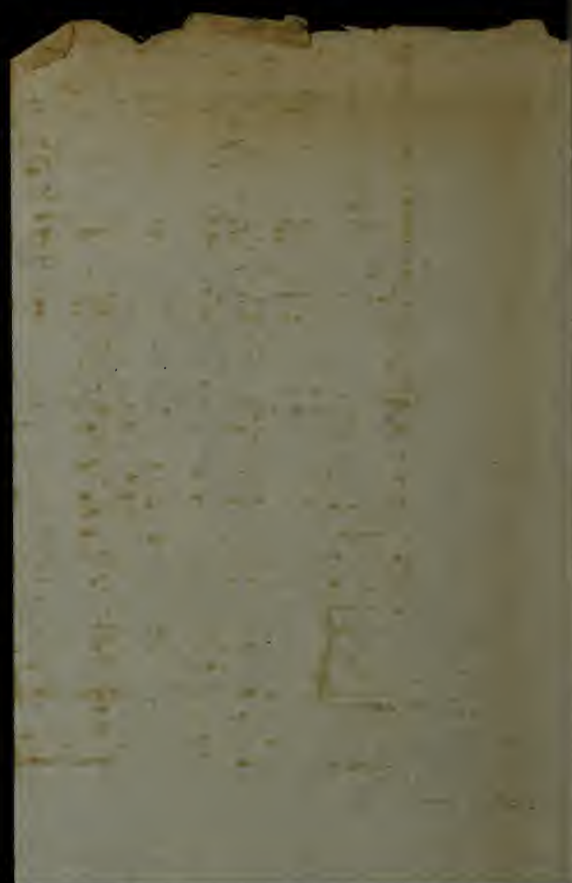
Farmers at the recent Ipswich Agricultural Show were amazed at this new invention. Already a company has been formed to manufac-



bale 3.25 100th

5 F_a 16

6" mixed pent & gravel,
intermittent struts, layers
of stone, cover with
sails & ~~repeat~~ (total c. 12");
repeat



ture the equipment and supply the necessary chemical elements. The name of the company is British Cultivations, Ltd., and the process has been fully patented under the name "Kwick Grow."

No Earth Is Required.

Dr. Spangenberg made his discovery by analyzing the most fertile soil he could find and duplicating its nutrient content in a chemical solution. This solution is fed to the seed. Only small quantities of water are required and no earth is used. The seed germinated by this process are said to produce five times the volume of seed planted in the ground.

Each cabinet in which the seeds

are placed is divided into ten sections, one for each day's growth, and each section contains eight trays. As each day's crop is "harvested," more seed is immediately put into the trays to produce another crop in ten days. Thus, the farmer has a fresh crop, approximating the finest June pasturage, every day in the year.

Kitchen-Grown Vegetables.

Orders are being received for cabinets from farms in all parts of England, including one farmer who is a tenant of the King at Sandringham. In Germany the government has ordered them in large quantities to be used in concentration camps.

With the growing of crops for feeding animals successfully achieved, investigators are now experimenting further with growing vegetables. This process is still in the experimental stage, but the men working at it have in mind the ultimate production of smaller cabinets which could be kept in homes—in the kitchen, like an icebox—to supply the family with fresh green produce all the year round. The growing of fresh vegetables is expected to require somewhat more time than fodder crops.

F. H. Hedinger, a naturalized American who is a director of the company, has been in communication with the American Embassy in London and authorities in the United States, offering a demonstration of the process as a means of alleviating the fodder crisis caused by the drought. He expects to leave soon for America.

mollus kept away by
santalum, rosemary,
wormwood.

Try raising potatoes in
small box on stand with
drip tank water fed, using
Maori - Russian idea plus
the opposite idea, dissolving compost or
powdered stone in the water. If
successful this would give a
method by which very poor
people with no land could raise
food on roofs. One would require
very slight amount of land.

Use peat moss for this, to hold
water

Re Bess, why not make a glass bottom to
hive with some sort of removable shield, &
hive all set up high enough from ground
so as to get under them at night & detect
by sticking touch the growth of queen
cells without disturbing the hive,
thus forestalling swarming. Might
have a film of ellophane or rolls in
a camera, just above glass bottom so
as to catch dust. Every a propolis at
cracks. Perhaps have each hive capable
of being elevated. Better put on
bench. Perhaps a metal slide
just above glass would avoid propolis
trouble.

Swarming is necessary tho' get a new
queen. But perhaps manipulation of
the old queen, putting her in a cage
in the old hive and transferring some

new ones would do it. Perhaps the new knowledge of how bees follow one another & transmit knowledge will help.

Still He Serenely Cultivates His Garden

ENCHANTED ACRE. *Adventures in Backyard Farming.* By Gove Hambidge. Illustrated by Ruth Hambidge. 344 pp. Sunstead Series. New York: Whittlesey House (McGraw-Hill Book Company). \$2.50.

THE "adventures" which Mr. Hambidge mentions in his subtitle are quite as much in spiritual as in material things. They, and, in fact, the whole book and the "Sunstead Series," to which it belongs, have a certain kinship with those "adventures" that lured and so richly repaid the army of David Grayson readers through his long list of books. But the kinship is not close, and each author is, very distinctly, himself, alone and unique. Their community of endowment lies in the ability of each one to gather interest, inspiration and nourishment of the spirit from his environment. But Grayson was chiefly interested in man, human nature, while Hambidge turns to the good earth and all its prolific life as surely as the sunflower to the sun.

Those who read his former book, "Time to Live," will turn eagerly to this new volume, the second in his charmingly titled series, which is to centre about the "farm"—which, he explains, is merely an acre and a quarter on a stony hill-top—the home and the life which he and his wife have carved out of the elementals, while they have made the effort afford self-expression, interest, freedom, reasonable leisure, satisfaction and happiness.

While the first volume in the series outlined the general story of what he has done and how he has done it on the practical side of realizing this purpose, it dealt at length also with the philosophy of life he has worked out, how he has found in it "time to live" and made it yield in rare measure the pleasures and satisfactions of life, this new one goes into the matter in more detail and keeps in closer touch with the earth.

There are chapters on the garden, the orchard, the animal life, on certain adventures with bees and goats, the general subject of living on the land, the relations between green leaves and human beings. With both practical and scientific knowledge these matters are considered in detail, with account of how he works at each one and fits it into his scheme of life.

As Mr. Hambidge gets toward the end of a chapter on "Green Leaves," wherein he has talked about subsistence farming, in the economic theory and aim of which he has very little confidence, he dwells on the satisfaction he gets from the modified and limited farming he does in his back yard and describes the experiments and achievements of some of his friends who, intellectual workers, are also carving out homes and ways of life in secluded places. Going on to discussion of how leaves live and grow and the importance of chlorophyll for vegetable life, and so for animal life and human life, he per-

mits himself a bit of mystical interpretation and continues:

It would be easy to stress a mystical element here, namely, that our love of green things, broad green landscapes, trees, grass is based on something more than esthetic appreciation alone, that is, on an absolute dependence on green things for life itself, from the beginning of time, before we were human beings. It seems hardly possible that this would not have affected our attitude and feelings—that we should not have had a love of green things woven into us, as man has a love of the body of woman for equally deep reasons.

"It is not really," he says, "that this acre where we live is an enchanted acre * * * but the life on it has had the quality of enchantment * * * This is a rare thing—to feel that life has the quality of enchantment while it is being lived." So, too, is it a rare thing for an author to be able to make his readers feel some measure of that enchantment and to understand what it means for him. But this Mr. Hambidge begins doing with his first page and keeps on doing all through his "hodgepodge" of homely subjects, excursions into philosophy, adventures in fancy, touches of humor, to the last page, when one stands with him at his back porch, looks up at the sky thickly strewn with Winter stars and believes with him that "these things are good things to do and to see."

FLORENCE FINCH KELLY.

Weeds

Their Place in the Economy of Nature

Weeds. By W. C. Muenscher. \$6.00.
New York: The Macmillan Company.

A WEED is not always a useless, ugly, harmful plant. Behold the black-eyed Susans, buttercups, mountain laurel, and many attractive flowers classed as weeds. A weed is a plant which grows where it is not wanted, and usually interferes with the growth of other plants that are desired and cultivated. It is surprising how weeds will thrive under adverse circumstances. They are good travelers, though they have no power of locomotion, but man and animals, wind and water play an important part in their dissemination. Hay and feed stuffs, ballast from freight cars and boats, threshing machines and hay-balers, manure and packing materials, all aid and abet the spread of weeds. Of the five hundred weeds described in this volume, 196 only are natives of North America; the rest are undesirable immigrants. Weeds, many of them, act as hosts to fungi and bacteria, others are poisonous to stock or injure farm animals. On the other hand, weeds plowed under add humus and nutrients to the soil; some of them furnish forage for animals and others are edible by man. A long list of weeds has been prepared that have medicinal properties and are used in preparation of medicines and drugs.

Largely, however, weeds are to be fought, killed, exterminated or at least controlled. For preventing the spread of weeds, Dr. Muenscher urges clean seed, mowing waste areas early, avoiding the scattering of weed seeds by farm products and machinery. The tops of weeds may be destroyed by all kinds of hoeing, plowing, harrowing, mowing, spudding, and by fire, steam and chemical treatment. Underground parts of weeds may be destroyed by rotation of crops, drainage, smother crops, straw mulch, mulch paper and chemicals such as sodium chlorate, sodium arsenite and carbon bisulfide. A whole chapter is devoted to chemical weed control which is fast developing into a major and very effective weapon. This whole matter is brought thoroughly up-to-date by the author.

The main part of the book is a botany of weeds. Keys, descriptions, illustrations are provided for the

identification of weeds. Also a paragraph is added to the description of each weed showing the best methods of control for that particular weed. The volume is a valuable aid to the gardener and farmer. It will prove of great interest also to any student of botany and offers an unusual hobby for a summer's study in the country or in one's own back yard.

T. C. R.

FIVE ACRES. A practical guide to the selection and management of the small farm. By M. G. Kains. Illustrated. 371 pp. New York: Greenberg, publisher. \$2.50.

MR. KAINS divides the people who have a hankering for a few acres and life in the country into two classes, those who are sure to fail and those who may succeed. He wants with this book, he says, to help both classes and hopes it will make possible success for both. He likens its use by would-be five-acre farmers to the use of a road map by any one taking a long automobile journey, because he endeavors in it to indicate safe roads to follow and to warn against those that will lead to disappointment and perhaps disaster. He has taken especial pains all through it to point out and advise against the mistakes that those who are not familiar with farm work and country life are likely to make.

The early chapters are taken up with consideration of the advantages and disadvantages of country life, the ways of beginning and carrying on that lead to failure, preliminary matters to be decided and factors to be looked out for. Then come questions of finance, of water supply, sewage disposal, what livestock can be kept, what crops grown, the planting and care of gardens and orchards, the soil and its care, and so on.

Mr. Kains, who is special crop culturist in the United States Department of Agriculture, and lecturer on horticulture in Columbia University, evidently is thoroughly well versed in both the scientific bases of farming and practical farm work and his detailed advice and explanation on every topic treated leave little chance for even the ignorant and unskilled person to go wrong in his farming operations if he is intelligent enough to trust his guide and follow directions. The illustrations, line drawings in the text, help to make clear the text.

May it be that by making a solution of good
compost we can grow plants rapidly in pans
or pools of water? Perhaps add soil to
dissolve certain organic salts. This would
eliminate need of plows. Perhaps bog
cabin U.S. Knorr method is best & will save
much. Or perhaps use a peat moss constant
ly moistened by such a solution. This
provides air for roots better than water alone
would do. If it is to be in water, there
should be some water plants in the water
which will give off O for benefit of other
plants whose roots only are in the
water. Cf. Kachinik method.

"Herbs and the Earth" by Henry Barton
Doubleday Doran May 1955

By use of steam pressure cooker
preserve for winter some leafy vegetables
(spinach, chard, beet greens); some root
vegetables (beets, carrots,); some
pods (string beans, wax beans); some ^{meatless}
meats (peas, lima beans); some fruits
(grape juice, blue berries, strawberries,
raspberries, apples, peaches, pears, cherries).
Then use grains & legumes dry, & sprout
them. Also dry fruits & vegetables.

Peggy Norton says the asterina
family of herbs (southernwood, wormwood,
etc) seem to be entirely free from insects
& fungi. Most aromatic herbs are also
less liable to attack by insects than most
vegetables & flowers, she says.

Culture "by the Acre"

Field, After Research Work for the Government in Finds a Way to Help Solve the Farm Problem

By William E. Brigham

SMOKE PIPES

his cunning little match for my new rl. I've been all the right curved y tipsy hat. How k with a straight out I daresay you'd e left side of your , or the center, it to make your face

noticed that when jamas and light up s something very t a corncob, isn't

ne a good book and up for hours at a ague. B- the way, ntown Thursday to co bargains. Want

to—maybe I'll get myself to that im-amber combination n Newell's window. Well, so long—don't smoke.

keep the home m "The Spur of the Courier-Express

erosion will be checked, because the runoff water can be held within the speed limit, which strips off the surface soil and deposits it in the rivers. This eroded material is kept on the farm. Whenever practicable, this can be supplemented, in correct quantities, by farm and municipal sewage, thereby manuring the water preparatory to manuring the farm land. This sewage, scientifically treated, makes two blades of grass grow where one grew before; it causes thousands of microscopic plants to grow where one grew before, and, best of all, it starts a new cycle of matter wherein lifeless material is transformed into living organisms; and we have before us the proof that water, soil and atmosphere are the raw materials of life and, consequently, the true base raw materials of business.

+ + +

Fish culture "by the acre" is the dream of Dr. Field for the American farmer, and he illustrates it by

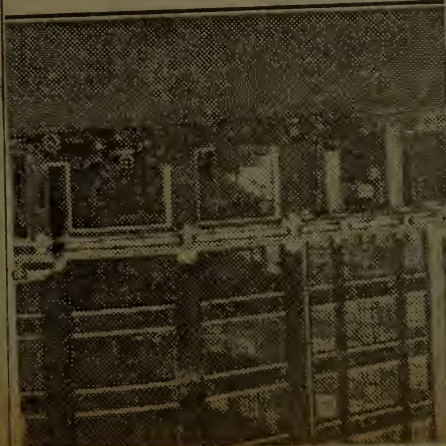
ent for life. Properly treated (and all this may be done without offense to the neighborhood), the outflow of liquid after the gas had been taken off, and before the dry residue which makes such excellent fertilizer is reached, would reinstate the cycle of matter which is the law of life. As the flow passes off into the water, the vegetable substances are broken up by bacteria, which then become the infusoria upon which the crustacea feed; and these, in turn almost microscopic, become the food of the fish. It is the working out of this beneficent cycle that is illustrated in the German ponds.

+ + +

For the American farmer, especially in the States of the Mississippi Valley, where conditions are practically ideal, Dr. Field urges a scientific yet easy utilization of the waters which come down from above upon his own land, or flow through

For Lincoln cars on both the street and Ford Building at Cottage Farm Bridge Serv

Ford Building at Cottage Farm Bridge Serv



by motor car manufacturers dropped 36 when the total amount of steel consumed in the steel industry condition resulted in 1929. A similar pounds compared with 1929. The year dropped approximately 97,143,000 the total amount of cotton it used during countered its first abrupt decline in 1930 "When the automobile industry en- forms than any other single industry. McDarby. "They use more steel in all in the American market," says Mr. out of every ten bales of cotton consumed manufacturers require nearly one bale "In normal times motor car and the Company. charge of sales of the Auburn Automobile says N. E. McDarby, vice president in nite upturn in the automobile industry. be among the first to benefit from del- Cotton growers and steel workers will

Auto Sales as Aid to Cotton and Steel

our salesroom floor." This is a new low-priced eight now on new line are available to the public. Full details of one of the models in the plans has been lifted by the factory, and "The secrecy which has enveloped the exclusive of one. and Government securities on hand ex- panies exclusive of one, and first in cash- enment; first in profit among all com- dollar of plant and real estate invest-

Quarters



Some interesting experiments reported in Science Service for Aug 24, 1935 show that the soil in ordinary cornfield is about 38° hotter than soil of prairie sod, too hot for nitrifying & other bacteria. Also that air at various heights above cornfield was much hotter than that above prairie sod, & that evaporation of soil moisture was far more rapid from above the cornfield. All this validates the Ross garden method. It also suggests why not try keeping a sod all through the garden, - having a vegetable garden in sod. Saves erosion, too, & much labor. ^{Maybe} I have the soil drained once for all, for aeration. ~~But~~ Try this out, using a low growing grass. Work out a family of vegetation, mutually

well balanced and with sundry herbs
intermingled to keep off harmful
insects and fungi. What plants are
fungus resistant?

Pennyroyal is repellent to ants. ∴ Try
planting pennyroyal near vegetables, such as
cabbage, which are bothered by plant lice, for
the lice are often put there by ants.

Publishers of books on agriculture: -
Macmillan, Orange Judd, D. Van Nostrand,
Putnam, Little Brown, Sippincott,
Doubleday Doran, Country Life, Scribners,
Harcourt, Greuberg, Houghton Mifflin,

The black locust ^{tree} is a good soil binder.

To avoid heavy land Taxation live in
a mountain county where there are
not too many roads.

Dehydrated Foods by Mrs. A. Louise
Andrea - The Cornhill Co.,
(24 Park St) Boston 1920

Tree Crops: A Permanent Agriculture
by J. Russell Smith.
Harcourt Brace & Co. 1929

Natl Geographic May 1916.
Article by O F Cook of Bureau of Plant
Industry re cultivation system of Ancient
Peruvians. Mason Terraces. Irrigated
6 to 8 ft high. Facing posts fairly
close together laid horizontally with
this stile. Stones at bottom 9"

about - foot for each layer

deep 1 ft bed on top of 3 ft of dead
leaves, moss, fern, grass etc, no
manure. 9" gravel bed:
platform of sticks interlaid 2" dept
layer of seed potatoes. laid close, tubes
actually touching. Sides of hillside
earth just enough to cover the seed;
6" layer of coarse gravel ^{interlaid sticks etc.} repeat to
top of terrace. Top layer of 2 ft thick
to stand off, mixture of fertile soil,
well rotted leaves, grass, and
matured latrine soil containing
fish scraps. Melons, pumpkins
etc on top. Also done in pits
12' x 12' x 12'.

In an article in the Spring 1936
number of the Yale Review, Raymond Pearl
states that the roots of maize in the course of

a mass of shale 35% as much carbon
(as CO_2) as is stored in the plant (care?)
itself. If so, perhaps that is ^{one} reason
why the Massie system of planting
potatoes (a high starch content plant,
does so well. Try that system for
any beans, sweet potatoes, Jerusalem
tomatoes, beets, chards, chard
artichokes, etc. Compare carefully the labor
involved in the building, ^{watering} and taking
down (for harvest) of such structures
with the labor of plowing, cultivating,
weeding and harvesting in the field,
and include in the comparison the
two amounts of yields.

An advantage in the Massie method
is the much greater control of the soil
mixture; also the smaller area needed,
& no weeds. Keep piles of earth and
compost near at hand. Indeed, make

would not have to hire help or depend on others for time.

the compact nearly, so as to save handling.
Another advantage is that, ^{by ordinary methods} ~~now~~ plows,
harrows, tractors, or horses or mules
would be needed. ^{by Maori method} Only shovels, hoes
^{possibly a rake.} rakes and a wheelbarrow. Offhand
it would seem to me that there would
be less total labor in the Maori
method. Having only hand tools
would not only be simpler and less
expensive, but give all the advantages
of complete control and the psycholog-
ical advantages of no machinery.
It would mean much less ^{than small taxes.} land is needed.
Being so inexpensive would mean it
could be more readily adapted by un-
employed or very poor. If such structures
were built just south of a shed, the roof
water from the shed could be led to drip
on these piles.

Use witch grass roots for baskets.

Japanese Billerueet is a rapidly growing & very attractive vine. *Elymus Saphire* a yellow flower at Anna Friedman's *Sippia Repens*.

The companion protective plants will be very useful to the poor by saving cost of spray & spraying machines. Also eliminates danger of poisoning.

Principles of Soil Technology, ^{University}
1950. ; Plants & their Uses, Sargent
H. H. H. 1955

Another advantage of Masoi method is that the plants cannot be trampled & thus injured by people or dogs or cattle.

Perhaps the best arising from Mannie
method keeps off frost & starts seeds earlier
& thus lengthens growing season & hastens
growth & ripens stuff earlier than usual &
so can get it on market ahead, & perhaps
get more crops per season. Plant a few aro-
matic herbs to try whether they will
protect us from frost, or claimed.

When drying ^{peppers} ~~peppers~~ or other sweet fruits
and spices (Tanny)
for raisins, keep aromatic herbs that
repel moths & flies near & on the fruit
in order to prevent ~~of~~ them from laying
eggs on fruit & subsequent maggots.
This will be much better than commercial
^{certain herbs or spices would also keep off mildew.}
sulphuring method. The honey also in
that preserving is as to keep moist. Thus
can simply ^{& hygienically} preserve fruit sugars for
winter.

Dr. W. F. Giesche, Associate Plant
physiologist of U of Calif. Has by
plant pill in water (10 chemicals)
217 tons of tomatoes per acre and
2465 bushels of potatoes per acre.
as compared with 116 bu.

Took this up in Science Service
New Republic Jan 3, 1936.

Trey, German. mirror (dry tree)
stick for keeping birds out of the
wheat, + out of cherries + grapes. ^{Aluminum} foil strips
are best. Used in Scandinavia

The agricultural problem for me is
to produce foods which preserve well,
require little heavy toil (in reference to
increasing age) ^{do not need great area,} do not produce soil
erosion or loss of fertility, and produce
foods which fit into Clark diet.

Whereas goats (milk) and chickens (eggs + meat) require constant daily attention, soy beans, ^{sunflowers} and nut trees yield proteins of good quality and yet can be left for several days without attention. ~~See~~ also store well till needed.

The Maori system plus Ross 3 story garden, plus fruit & nut trees, plus Howard compost method, plus grape vines, berries and bees will do this very well. The honey will give sugar for preserving fruits as well as for daily use.

Maori method avoids trampling by dogs or people, but probably should be a barbed wire fence around it to keep ^{keeping} cows off. also to keep curious people away.

Re sheep, remember that dogs are a great enemy.

Re Soybean

Already in those distant millenniums the Chinese knew "ta-teon" as a plant of almost miraculous diverse uses. When floods damprotted or drought destroyed the grain crops, the healthy and imperturbable soybean vine rarely fell below half its yield, so that generation after generation came to know it as its mainstay against famine. As the wild hunt animals died off on the Chinese prairies and the human population crowded out the domestic livestock, the soybean became recognized as the vegetable that gave strength to millions whose meatless days lasted for centuries.

Meanwhile soybean acreage climbed with the markets. There were 1,000,000 acres in 1922, close to 2,500,000 acres in 1928, 4,000,000 acres in 1934. The Agricultural Department's experimenters and technicians were finding out new and favorable things about the "little honorable plant" as fast as the industrial laboratories. If the right varieties were chosen, it was speedily demonstrated, it would grow anywhere from the blizzard-stricken prairies of North Dakota to the sub-tropics of the Gulf Coast Delta; from the sandy soils of re-

cently reclaimed deserts to the stony soils of New England.

The idea of its soil-building properties proved to be no ancient Chinese superstition. The "wonder bean" restored nitrogen to the soil, replenished the phosphates; plowed under, it made the most efficient of all vegetable fertilizers.

Wherever the post-war farmer has turned, in short, he has found another argument for planting soybeans, and to make last year's bumper crop, 600,000 farms in twenty-seven States grew them. In its boom years of the nineteen-thirties the less-than-lima-sized morsel definitely became "big business."

Being a legume it
replenishes the soil
nitrogen.

There is an American
Soybean Association.

A good cash crop for
hay or for making into
industrial
plastics, oils, etc.

Frank Bros Seed Co.
Bloomington, Ill.

Univ of Nevada, College of Agric.
on organic phosphates which
are soluble and so will
penetrate the soil to where
the roots are.

Re Steiner's Agricultural Methods
From "God is My Adventure" by Ron
Gordon, - Knopf, N.Y. 1935.

p. 34 "Steiner's agricultural methods are based on his acknowledgment of the earth as a living organism....

314 "Anthroposophical farmers produce their own manure out of natural remnants to be found on the farm, such as animal dung, vegetable remnants, old foliage, bones and other natural refuse. Out of such remnants large compost heaps are built, and such plants and herbs are added to them as have beneficial effects upon our health. Steiner indicated that the following six plants should be used for that purpose: dandelion, yarrow, nettle, valerian, carnation and oak root. The qualities of these plants are strengthened by a special preparation, and their use engenders in the soil the same chemical processes that are caused by artificial manure, but instead of being forced upon the soil suddenly, these processes grow in it organically. There is no sudden stimulation, no sudden shock as with ready-made manures, the natural

"A garden worth while must be individual, native, a product of taste and thought instead of rule or fashion, and hard worked." - Mearns

New type of ^{gum} wood stone, write Robert E. Miller, Inc., 35 Pearl St., N.Y. City. J.E.G. knows of it.

Soybeans use much soil phosphate and their seeds require inoculation. The mature soybean contains 40% protein, 18% fat, 4% ash but no starch. : grand for Hay diet.

"Successful Farming" - Meredith Publ. Co. Des Moines, Iowa. 50¢ per yr.

PLANT EXPERT DERIDES OLD GARDENING CODES

If They Fail to Aid Propagation Violate Them Deliberately, Says Dr. Crocker.

If rigid adherence to the time-honored codes of practical gardeners does not bring success in plant propagation, try deliberate violations of those laws, Dr. William Crocker, director of the Boyce Thompson Institute for Plant Research, advised his audience during a lecture at the Museum Building in the New York Botanical Garden, Bronx Park, yesterday.

As an example, he said that in setting out soft-wood cuttings, the prescribed practice was to strip most of the leaves, apparently on the theory that they absorbed nourishment needed for the coming roots.

However, he said, extensive experiments have proved that the leaves provide the nourishment the roots must have, and should be clipped only in those rare cases where they exhaust the moisture in the soil too rapidly. In a number of cases, he said, the greatest success had been obtained by leaving on all possible leaves and burying some of them in the soil. A reason he advanced for the frequent abandonment of old methods was that there are hardly two plants which should be grown under identical circumstances.

"Nurserymen used to say," Dr. Crocker remarked, "that a practical way of raising holly would be worth a million dollars to any one. The old belief was that holly seeds would not germinate except in a state of nature. As a matter of fact, they germinate very well, but usually only after a period of eighteen months to two years."

Rhododendrons are now being propagated in this country for the first time, Dr. Crocker said, a fact which will be pleasant news to many gardeners, since the supply which formerly came from Europe is cut off by quarantine.

small parcel.

Herb Growing and Cooking

L. B., New York City, and H. B., Ithaca, N. Y., ask for Christmas books on herbs, their use and cultivation.

There is a beautiful one by Henry Beston, "Herbs and the Earth" (Doubleday), good to read even if your resources go no further than a window box, and practical if you can actually plant. "Gardening With Herbs," by Helen Fox (Macmillan), describes sixty-eight herbs for flavor and fragrance and has lovely pictures. Maud Grieve's "Modern Herbal" (Harcourt) is the one you will probably come to if you get involved in this subject, which seldom lets you go; it is a handsome, comprehensive and scholarly work, costing ten dollars; the same author's "Culinary

Herbs and Condiments" (Harcourt) is a briefer, less expensive guide. Houghton Mifflin has recently published Marcus Woodward's "Leaves From Gerard's Herbal" (1597), arranged from this famous work to form a garden calendar. Two tiny books on this subject will get any one interested in it: "Thirty Herbs Will Make an Herb Garden" and "Ten Herbs Will Make a Kitchen Bouquet"; they are by Helen Lyman, published by the author, Santa Clara Avenue, Oakland, Calif. The first gives basic principles of cultivation and has a packet of mixed seeds attached; the second is about simple cookery and has a paper of mixed ground herbs; as time is short, I add that the first costs a quarter and the second thirty-five cents.

M M P. Binghamton, N. Y.

TO PRESERVE NUT MEATS

Agriculture Bureau Offers Easy Method for Use in Homes.

A new home method for keeping nut meats fresh—using a water bath canner such as many housewives use to process fruits—is announced by the United States Department of Agriculture.

Many farm families who make a Winter industry of preparing shelled nuts for sale or home use, often take a loss when warm weather causes the oil in the nuts to become rancid. Commercial concerns avoid this staleness or rancidity, caused by light and heat in combination with air, by vacuum packing the nut meats.

The only equipment needed for vacuum packing nut meats at home, says R. C. Wright of the Bureau of Plant Industry, who developed the method, is glass fruit jars to hold the nuts and the water bath canner to exhaust the air from the jars. He says:

"Fill glass jars with nut meats and adjust the glass lids and rubbers but do not tighten them. Set the jars in a water bath canner—either a clothes boiler or a big kettle with a rack on the bottom. Use enough water to reach almost to the top of the jars. Keep the water boiling for 15 or 20 minutes. Then seal the jars and leave them in the water until it begins to cool. Store the jars in a dark room or cover to keep them from the light. Thus processed, nut meats will keep fresh even during hot weather."

By sprouting ordinary beans
the starch is changed to sugar &
the beans then become digestible.

Vitamin C also is produced so.

keeping the plants out of water upon a wire mesh and letting the roots of the plants strike down into water. That worked fairly well but still seeds could not be germinated well and such things as potatoes would not grow.

Finally, the present plan was devised. The tank is filled with water and a fine meshed netting is spread just an inch or so over the water. The water level is maintained automatically below the mesh by a blanket of sawdust and other fibrous materials is spread over the seeds, or potato eyes are spread. Then, another blanket of sawdust, wood fibers and the like, is spread over all.

erals—iron, calcium, nitrogen, phosphorus, iodine, sulphur and trace elements. Most soils contain these, and they are lacking they can be supplied by fertilizers. But, as the year after year, soils become exhausted, and thus more fertilizers need be used. And, probably more fertilizer is wasted on the ground than is actually used by the plants, this soon becomes a expensive business—cutting down farmer's fractional profit to nothing. Since all this mineral food plants must first be dissolved in the soil before the plants can take it up with their roots, it is obvious that, provided the minerals can be supplied adequately, there is no reason why soil need be used at all. Simply grow the plants in water and feed them the minerals they need.

That is the idea of the new farming—and it is not new at all. What is new is two things.

First—the chemicals fed and rate and amount of feeding. Gericke in particular, has worked out a formula and a feeding schedule which, he has demonstrated, works. What this is; he is not understood, however, in American agriculture has been given facture and dist pills and plans shortly. Other and they, too, are being perfected ation.

Second—the crops in the tanks have been well worked secret at all. In the experimenters tried plants by just putting like narcissus bulbs the house for winter but not work at all—most died and seed would not germinate satisfactorily.

Then the plan was hit upon of

food or certain minerals, the plants would be stunted. If they had too much food, or too much of a certain element, the plants would go to leaves and stems and fail to produce enough fruit or flowers. But, by exactly maintaining the proper balance, the plants are kept right on schedule and bear amazingly.

Harvesting is even more simple than growing. There is no back-breaking labor of digging, as in the case of potatoes. When the spuds have grown large enough, the plants are simply cut off down to the level of the blanket and then the top layer of the blanket is peeled off, exposing the tubers ready to be picked up.

Two workers, A. Hastings-Thomas and V. C. Dashwood—who call their new idea cabinet-culture—have turned a single acre of floor space into a greenhouse at King's Cross and a hay farm which yields as much fodder as 160 acres of ordinary grass land. With a dime's worth of grass seed, they have produced 20 tons of hay and they assert that they can grow a crop of grass in a day instead of only one a year! This, they claim, is most important, because it enables farmers to feed their stock fresh fodder every day instead of feeding them four or five months a year with dried hay cut in the summer. The fresh food, they report, is so much richer and nourishing that it not only causes the cows to give more milk but also better milk, more cream, more vitamins—and more profit for the farmer.

insects chew them up or diseases rot them before they are harvested. Beans, cabbage, lettuce, also have turned out successfully and, as for strawberries — tests upon Dr. Gericke's berries have shown them not only to be sweeter and juicier and bigger than field-grown berries, but also to have at least an equal content of vitamins and food values.

What Dr. Gericke and others have done with vegetables and flowers, other scientists are doing with different types of plants. Prof. R. A. Davis, also of California University, is ex-

REAL
TOR
DEN.
DEP
COMP

KEENI

York, New York
permening with it like. Over wheat and corn and the like. Over in England, five years of experiment-taken with grass and fodder crops has been carried on by the ministry of agriculture.

1936.
ds"

Test-Tube Truck Farms

Condensed from The Commentator

Arthur W. Baum

THE DAY when you can go down to a little truck garden in the basement and pick your own fresh greens and vegetables for dinner may not yet be at hand — but there is promise in the air.

In practically every agricultural college, in government experimental stations, in the Bureau of Plant Industry, plant physiologists today are growing full quality, heavily productive foods and flowers without a vestige of soil. Consider a tomato plant 25 feet high, with fruit from one end to the other — the whole growing on nothing more than a three-inch layer of excelsior and sawdust suspended on a wire mesh over a shallow pan of water.

Years ago it was understood that soil is simply a medium from which plants extract chemicals; that if the necessary chemicals were made available to plant roots by some other means than soil, the results were just as good.

But it was not until after the war that investigation speeded up. Two branches of research unfolded: sand culture and water culture. The sand culturists placed their plants in clean, washed sand

and flooded the beds with solutions containing feeding chemicals. The water culturists laid mats of excelsior, sawdust or practically any porous and absorbent material on wire meshes over pans of nutrient solutions so that the plant roots could dangle in the feedbox and enjoy an endless meal.

Foremost among the water culturists is Professor F. W. Gericke, associate plant physiologist of the University of California. Step by step he probed the chemical needs of growing plants. Then he laid electric heating cables in his solution tanks, dissolving the chemicals at a carefully accelerated pace and — produced the miracle. Gericke tobacco climbed 20 feet. Potato plants deposited hundreds of clean white tubers. Onions grew three deep. The plant world was literally on a spree.

A tomato patch in reasonably good farming country can yield five tons of tomatoes per acre in a season. Professor Gericke's tomatoes, on an acre basis, bore more than 200 tons! Further, he had ripe fruit in four months and a continuous bearing plant for the ensuing nine months. Harvest ev-

© 1937, Payson Publishing, Inc., 101 Park Ave., N.Y.C. The Commentator, a new monthly edited by Lowell Thomas, aims to provide a medium for the men and women who have won wide audiences through the microphone to express themselves in more enduring form and without the censorship necessary in radio

ery day for three quarters of a year! Ordinary potato growers on the farm secure 120 bushels to a crop. Gericke potatoes made an acre crop of 2465 bushels!

Sand culture too, has its miracles. In England, a while back, a dairy group was sprouting corn in cabinets, drawing out each day a shelf of fodder and replanting for the next crop to come along in just ten days. At the New Jersey Agricultural Experiment Station, Dr. Robbins has cotton plants with beautiful bolls growing in small pots of pure sand. He has had tomato plants climbing out through the greenhouse ventilators.

The new chemical agriculture is more than a laboratory freak. The chemicals are cheap, and comparatively little water is needed. On the basis of Gericke results it is possible to put an acre under glass on the edge of a city, and thus produce crops that now require a 40-acre truck farm. Already there are four commercial installations of the Gericke process in California. And this past year some citizens of San Francisco have, whether they knew it or not, purchased ripe tomatoes that were not born of earth; business men raised them by factory methods and marketed them at a profit.

For the moment the commercial direction of water culture is toward Arizona, New Mexico and Florida. In the populous East, where the development would be most useful, it runs up against excessive heating and lighting costs — due to erratic weather and long winters. But electricity is becoming cheaper every year and experience shows that costs invariably decrease as an enterprise grows.

However, there is no apparent prospect for a vast and rapid shift from land to greenhouse factory — with resultant economic disturbances. Eastern capital is definitely interested in the sawdust-and-water vegetable kingdom, but its present status is somewhat that of a rich man's toy — to produce expensive products for the carriage trade. Professor Gericke frankly states that in the growing of grain the chemical cropper cannot compete with the farmer; that he may encroach on the orchardist only in a few semi-tropical trees. The first assault on established agriculture will be a tentative one upon truck gardeners. And many truck gardeners are already in the routine hothouse business and so are ready to take over the new development.



The mind is like the stomach. It is not how much you put into it that counts, but how much it digests. — Albert Jay Nock

Health from the Ground Up

Condensed from Hearst's International-Cosmopolitan

Rex Beach

DO YOU KNOW that most of us suffer from dangerous diet deficiencies which cannot be remedied until the depleted soils from which our foods come are brought into proper mineral balance? No man today can eat enough fruits and vegetables to supply his system with the mineral salts he requires for perfect health, because his stomach isn't big enough to hold them!

One carrot may look and taste like another and yet lack the particular mineral element carrots are supposed to contain. Vegetation grown in one part of the country may assay 1100 parts, per billion, of iodine, as against 20 in that grown elsewhere.

Any considerable lack of essential mineral elements, and we sicken, suffer, shorten our lives. And the alarming fact is that our fruits, vegetables, grains and meats are now being raised on millions of acres of land that no longer contains enough of these minerals.

The first man to demonstrate this was Dr. Charles Northen, an Alabama physician who had specialized in nutritional disorders. He became convinced that we must make soil building the basis

of food building if we are to use foods intelligently in the treatment of disease.

"We know that vitamins are indispensable to nutrition," says Dr. Northen, "but it is not commonly realized that vitamins control the body's appropriation of minerals, and in the absence of minerals they have no function. Lacking vitamins, the system can make some use of minerals, but lacking minerals, vitamins are useless! We have been systematically robbing soils of the very substances necessary to growth and resistance to disease. Up to the time I began experimenting, almost nothing had been done to make good the theft."

Dr. Northen retired from medical practice to devote himself to this subject. By putting back into soils the stuff that foods are made of, he raised better seed potatoes in Maine, better grapes in California, better oranges in Florida, and better field crops in other states — better not only in improved food value but also in increased quality and quantity. He doubled and redoubled the natural mineral content of fruits and vegetables. He improved the quality of milk by increasing the iron

a humble living; if I was as virtuous as some of the heroes of political or business history, I might become great or rich, as they were.

There was nothing new and big to do. In the arts and sciences there was a lot to learn, from older masters; scholarship was the aim, not discovery. Duty, not adventure; work, not play, in a dull world, all done. And it was all a lie.

I shall never forget the thrill I had when I happened to read several historians on one episode, and saw that they differed on the facts of the episode. On all great events they did not all agree; so I saw, with elation, that there was a job for us boys in history. And not to learn but to make history, to write history. Every chapter had, and has, to be worked over and written over again.

The discovery opened my eyes to the other branches of "learning." I was alert, curious again, as I was at birth. And when I heard some college teachers — great men, greater than I could ever hope to be — expose the startling fact

that they did not know or could not agree on what knowledge is, in science, and on what was right, in ethics, I went off — a student, at last — to some European universities where, like my little boy at the faucet, happily I learned that the great grownups of Europe also did not know plumbing or anything, positively.

Then, at home again, came a sense of elation with the realization that here were opportunities, millions of jobs, big jobs and small jobs for all us kids, young kids and old kids, if only we could be saved from the old illusions and fairy tales and taught to see things as they are, straight, as solvable unsolved problems and opportunities. Life became worth living. Life *is* worth living.

Now, let me repeat that, this, my acquired view of the world as all unknown and undone, or half done or wrongly done, was good for me; it is good for my boy, and I think it will be good for all boys and girls. It gives purpose to their studies, to their play, to their work.



Illustrative Anecdotes—VII—

ALMOST EVERYBODY thought that Marshal Joffre had won the first battle of the Marne, but some refused to agree. One day a newspaper man appealed to Joffre: "Will you tell me who did win the battle of the Marne?" "I can't answer that," said the Marshal. "But I can tell you that if the battle of the Marne had been lost the blame would have been on me." — Quoted in *News-Week*

and iodine in it. He caused hens to lay eggs richer in the vital elements.

At least 16 mineral elements are indispensable for normal nutrition. Of these, calcium, phosphorus and iron are perhaps the most important. Calcium affects the cell formation and regulates nerve action. It coördinates the other mineral elements and corrects disturbances made by them. Among the actual diseases that may result from calcium deficiency are rickets, bony deformities, bad teeth and nervous disorders. Phosphorus is also exceedingly important. Dr. McCollum of Johns Hopkins says that when there are enough phosphates in the blood there can be no dental decay! Iron is an essential constituent of the oxygen-carrying pigment of the blood; but iron cannot be assimilated unless some copper is contained in the diet. And if iodine is not present, goiter afflicts us.

So each mineral element plays a definite rôle. The human system cannot appropriate those elements to the best advantage in any but the food form. So we must rebuild our soils: put back the minerals we have taken out. It isn't difficult or expensive. By re-establishing a proper soil balance Dr. Northen has shown he could grow crops that contained enough desired minerals.

I met him because I was harassed by soil problems on my

Florida farm which had baffled the best experts. "A healthy plant," he told me, "grown in soil properly balanced, can and will resist most insect pests. You have germs in your system but you're strong enough to throw them off. Similarly, a really healthy plant will take care of itself against insects and blights — and will also give the human system what it requires."

When Dr. Northen restored the mineral balance to part of the soil in an orange grove infested with scale, the trees in that part became clean while the rest remained diseased. By the same means he had grown healthy rosebushes between rows that were riddled by insects. He had grown tomato and cucumber plants, both healthy and diseased, where the vines intertwined. The bugs ate the diseased plants and refused to touch the healthy ones! He showed me analyses of citrus fruit, the chemistry and the food value of which accurately reflected the soil treatment the trees had received.

I took his advice and fed minerals into land where I was growing a large acreage of celery. When the plants from this soil were mature I had them analyzed, along with celery from other parts of the state. My celery had more than twice the mineral content of the best grown elsewhere; and it kept much better, proving that the cell structure was sounder.

In 1927, W. W. Kincaid, a "gentleman farmer" of Niagara Falls, heard an address by Dr. Northen and was so impressed that he began extensive experiments. He has succeeded in adding both iodine and iron to soil so liberally that one glass of milk from his cows contains all of the minerals that an adult requires for a day.

"It is neither a complicated nor an expensive undertaking to restore our soils to balance," says Dr. Northen. "Any competent soil chemist can tell you how to proceed. First determine by analysis the precise chemistry of any given soil, then correct the deficiencies by putting down the missing elements. The same care should be used as in prescribing for a sick patient, for proportions are of vital importance.

"A nutrition authority recently said, 'One sure way to end the American people's susceptibility

to infection is to supply through food a balanced ration of iron, copper and other metals. An organism supplied with a diet adequate to, or preferably in excess of, all mineral requirements may so utilize these elements as to produce immunity from infection quite beyond anything we are at present able to produce artificially. You can't make up the deficiency by using patent medicine.'

"Happily, we're on our way to better health by returning to the soil the things we have stolen from it. The public can hasten the change by demanding quality in its food, insisting that health departments establish scientific standards of nutritional value. The growers will quickly respond. They can put back those minerals almost overnight.

"It is simpler to cure sick soils than to cure sick people. Which shall we choose?"

Radicals into Conservatives

A LABOR GOVERNMENT in England started a wave for greater social security, for the abolition of slums, and a Conservative government carried the policies further. It carried them, indeed, so far that it rebuilt England, and rehoused the nation; and the result is that on November 2nd the British county elections turned in an overwhelmingly Conservative majority. For men and women who have security in their jobs and in their old age, who fear no humiliation of public charity if they are unemployed, who live in decent houses, and have gardens, become conservatives, having something to conserve.

— Dorothy Thompson in *N. Y. Herald Tribune*

The New Republic, June 3, 1936.

The "Food of the Gods"

Comes True

DR. O. W. Willcox has for some years been writing books about the new science of "Agrobiology," which makes possible enormous increases in productivity of the soil through new technical methods. Some of his predictions have been criticized, by Secretary Wallace among other people, as being excessive. Striking confirmation of Dr. Willcox's general theory now comes from California in the form of a report by Dr. W. F. Gericke, associate plant physiologist of the University of California. Dr. Gericke has been growing tomato plants fifteen feet high and tobacco twenty feet high. He has produced 217 tons of tomatoes per acre and has grown 2,465 bushels of potatoes—against a United States average at present of 116 bushels. Many other vegetables have responded similarly, and striking results have also been achieved with flowers.

Under Dr. Gericke's method, plants are not set into the earth at all. Shallow tanks are filled with a liquid composed of some ten chemicals, all of them readily available in commerce, and this liquid is heated by electricity or otherwise. Over the tanks is spread a wire screen covered with straw, excelsior or moss, in which the seeds are planted, thrusting their roots down into the liquid below. The growth takes place in unheated greenhouses or, in the proper season, out of doors. The products of this process are of high quality, and in the case of tobacco it is possible to avoid the rankness that sometimes accompanies rapid growth under natural conditions. That this plan is not a toy of the laboratory is shown by the fact that tomatoes produced under Dr. Gericke's method are now being sold on the California market, at normal prices and at a commercial profit.

Forty years ago, H. G. Wells wrote a scientific romance, "The Food of the Gods," in which he predicted a development of this sort, which changed the whole structure of society. He may yet live to see his prediction come true, for possibilities of

these new agricultural techniques seem almost boundless. Already we are hearing stories of an occasional scientist who is said to grow a year's supply of potatoes for a large family in a tin pan under the kitchen table. It is possible to envisage all the vegetable foods for a huge New York apartment house being produced in a small space on the roof—unless, indeed, food became so cheap and so easy to produce that everyone moved to the country. There is as a matter of fact no especial reason why we should not have skyscraper farms, on which the rows of shallow pans would be stacked one above the other to a height of a hundred—or a thousand—feet, and reached by elevators. What such a development would do to 5,000,000 farm families, and to the millions of other persons who get their livelihood from the present agricultural economy, is a vista as exciting as it is terrifying. Certainly, the California experiments bring us one step nearer to that famous "economy of abundance," and make it still more absurd that millions of people should continue to go hungry.

Seedsmen

Edward F. Doble
Box B., Horseys Falls
N.Y.

Pedregued seeds (soya and
many others)

K. C. Sivermore Box R
Horseys Falls, N.Y.

Holmes Seed Co.
Box 16, Canton, Ohio

Potatoes seed
Porter & Bonney
Elba, N.Y.

Certified seed potatoes
H. L. Hodnett & Sons
Farmers, N.Y.

Piedmont vegetable Plants - Piedmont Plant Co.
Albany, Ga.

~~Hoffman~~ A. H. Hoffman, Inc.
Box 240, Sandusville, Seneca Co., N.Y.

Two soluble organic ~~salts~~ of phosphates
which do not "fix" and thus become un-
available ~~in soil~~ for plant food in
soils are calcium glycerophosphate

U.S.P. powder from Eimer & Amend, N.Y.
C. It is the mono phosphate. Another
is calcium glucose-3-mono-orthophosphate
This has to be made chemically by a
long process. Ca glycerophosphate
penetrated soil is that 75.01 % of it
passed through the soil as a leach
as against only 0.67 % for tuble
superphosphate such as is used ordinarily
on soils. The amount of phosphorus
was identical in all tests.

Experiments showed that ordinary
barren manure causes phosphates to pen-
trate the soil deeper than ordinary
inorganic phosphate will do. Whether it
exists in organic form in the manure
or fermentation may produce penetrating
organic phosphates.

Of the inorganic phosphates the greatest

soil penetration was secured by Di-
sodium phosphate, $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$,
Analytical Reagent grade, from Mallin-
crott Chemical Works, St. Louis, Mo.
It showed 11.51 % phosphorus in
the leachate as against the 0.67%
for triple superphosphate.

Must get down deep to the lower
feeding roots, where most of the hair
roots are & where there is the most
moisture, so as to supply P all
through the season & in spite of
drought. Taken from a paper called
"Phosphate Studies I. Soil Penetration
of some Organic and Inorganic Phos-
phates, by V. E. Spencer and Robert
Stewart, in Soil Science, Vol. 58,
1 July, 1934.

Good Ideas

After having my lettuce, peas and broccoli entirely devoured by a too friendly deer, I made some tiny bags of old muslin and cheesecloth about two by four inches in size. In each I placed three or four moth balls and tied them up with a twin string leaving six inches after tying. I took these bags to the garden and tied them to bushes, trees, the fence or even to a few tall hills of corn that stood near the smaller things. We often saw the deer walking through the meadow after that but they never came near my garden.

TOMATOES GROWN IN TANKS OF WATER

My Father says
**No Soil Used, but Chemicals Aid
'Culture' and It Is All for
Experimental Purposes**

1937

WOOSTER, Ohio, May 1 (AP).—Rows of hardy green tomato plants nod sleepily in long wooden tanks through which clear water slowly churns. Their clean roots spread over the bottom of the tank. Not an ounce of earth is in evidence.

It is Spring outside, but in the greenhouse of the Ohio State Agricultural Experiment Station Summer has come.

Dr. L. J. Alexander, associate plant pathologist, discussed water culture, the scientifically valuable method whereby experts hope to learn exactly what makes plants grow.

Water culture, he said, is the ideal means of "putting plants on a diet," and thereby learning which elements help and which hinder their development.

Although there is hope, there is no immediate prospect of the system becoming a commercial success, he warned, despite countless inquiries received from persons who would like to start a truck farm in a tub of water.

Water culture, he explained, is the growing of plants in water to which chemicals are added. He hopes to make findings which may help convert barren fields into productive acres.

The essential chemicals of the process are calcium, potassium, phosphorus, nitrogen, sulphur, manganese, boron, zinc, copper and iron. Some others in minute traces may be valuable. These elements are dissolved in the water, and the plant "steps right along" as if raised in the earth. Plants are supported in trays above the water and the roots reach into the solution.

Justice Roberts is 62 Today

Why not try to derive means
of utilizing whatever farm
produce cannot be sold or
whatever has a glut in the
market or spoils in the
fields. E.g. make bales, soft
stalls into manure, using both
water concrete water pit &
compost pile. Use both my
own land here and that of
my neighbors. E.g. 1/6
neighbors crops are ruined
by insects or hail, buy the
stalls for manure. Use my
neighbors waste.

(i.e. cheapest & easiest to raise)

Simplest sources of food: - starch:

starch - potatoes, Jerusalem artichokes, wheat
(imlin)

protein - soy bean, hen's eggs, fish, goat's milk, nuts

fats - soy bean, nuts, milk, eggs, butter, sunflower seed

sugar - honey, raisins, grapes, other fruits
Jerusalem artichokes

vitamins - A, green leaves, carrots, eggs, milk
butter, peppers, sweet potatoes, whole wheat

B, wheat, sprouts, str. beans, asparagus,
carrots, cantaloupe, grapes, soy beans,

C, cabbages, grain sprouts, citrus fruit,
lettuce, spinach, green peas,
tomatoes, blackberries, strawberries.
rose hips

D, milk, butter, cheese, eggs^{yolk}, leafy vegetables,
sunflower seeds

E, lettuce, wheat germ, whole grains,
leafy vegetables

G, But leaves, cream, egg yolk, apples,
asparagus, fish, asparagus, cabbage,
carrots, lettuce, tomatoes, peas,

Minerals - take care of themselves if soil is
adequately supplied.

Why not apply Gairdner's ideas to
marsh land by adding the needed salts,
then building a platform over the water

level and planting in that?

The Maori scheme is a crude approximation to ^{Gericke's} idea. If I mix stone meal, ^{or soil mineral colloids} in with the materials of my compost pile I ought to be able to supply, between that and the minerals in the decaying plants, all the needed minerals. Save some dry hay each year to make ^{part of} the top & bottom layers of the Maori pile, to supply heating material. The dripping water should be warmed.

The development of tree and vine crops and protective companion plants greatly reduces labor and equipment expense. How about companion trees and perennial vines? ? g. Pine beside

WEED CONTROL URGED

Loss to Farmers by Plant Pest
Ranks Next to Soil Erosion

URBANA, Ill. (AP).—Weeds are responsible for greater loss to farmers than destruction caused by animal diseases, plant diseases and insects, rodents and predatory animals, the annual meeting of the American Society of Agricultural Engineering was told recently.

Of thirty important items of farm waste, the report of the society's weed control committee said, soil erosion ranks first and weeds second. It added weeds levy in one way or another an annual tax of about \$3,000,000,000 in the United States.

The committee urged agricultural engineers to contribute to the development of equipment necessary in the battle to control weeds, adding that few people realize the burden weeds bring to agricultural production.

This emphasizes
the value of both the
Ross & Moore methods
& they agree, the
But still more the
importance of using weeds
for making compost.
methods. Use Soya

(continued)

apples; honeyuckle beside
grapes; or nasturtium vines
with apple trees to keep away
the codling moth.
Apply the Ross principle
to trees and new grass ideas
to Ross garden.

Like the Japs, take
poor land that is cheap
and make it better by Howard
methods. Use Soya

Jersusalem artichokes have ^{three} ~~two~~ advantages
over potatoes: They have more sugar in them
(dextrose or levulose) and hence are easier to digest;
they do not need cultivation; they do not get
troubled by potato bugs or other insects;
they are not starchy but inslin, especially easy

for diabetes; they are much more prolific, ^{of tubers} than
potatoes; they can stay in the ground all winter,
being not harmed by frost or freezing.
How about them for India?

Re farming plans, consider the comparative costs of buying vegetables through the late autumn and winter, with the cost of raising them in a greenhouse, - interest, repairs, obsolescence, plus cost of heating and care. Include an estimate of value of extra vitamins because of freshness.

Sundial Construction Explained

Re companion plants, how about making the soil repellent to unwanted grubs, viruses, or molds, etc by means of roots exudations of certain plants or herbs, or by the encouragement of other soil life hostile to or less favourable to such enemies?

New Brand of Control

'Tray Farming' May Be Answer to Problems in Rural Sections

Boston Transcript

Researcher in New York Plant Institute Demonstrates Practicality of Chemical Tank Solutions

Sept 22, 1937

LAKE SHENAROCK, N. Y.—In a little sunny patch of ground beside a modest bungalow up here in the country fifty miles north of New York city, Dr. Gould Harrold, associate of the Boyce Thompson Institute for Plant Research, is growing tomatoes in trays, their roots not in the soil but in tanks containing a chemical solution.

It is a practical demonstration of one of that small cluster of modern inventions which the National Resources Committee, in its recent spectacular report to President Roosevelt, predicted was capable of radically changing the entire complexion of American civilization.

Is "tray agriculture" the answer to the Dust Bowl? Is it the "out" for whole classes of Americans, capable of making them healthy, independent if not wealthy, wise, and sun-tanned, like a sort of sublimated "Townsend Plan" applied to agriculture, with the benefit of being practical? Does it offer a real permanent improvement in costs and conditions of living? And will it take the headache and the backache, the heavy investment and the poor return, the long hours and the insecurity out of some kinds of farming, on a national scale?

EXPERIMENT WITH TOMATOES SUCCEEDS

Here at Shenarock, Dr. Harrold will not answer those questions. It is too early, and the experiment is too modest. But he and Dr. John M. Arthur, famous biochemist at the Boyce Thompson Institute, who is supervising the work, are thinking in those terms.

For tomatoes—the produce now growing at Shenarock—"tray agriculture" is a success. Dr. Harrold has ten tanks in use. They fit into his small "side yard." In two or three of them, they have been making special tests. The plants even in these look as flourishing as ordinary tomato plants. But in the majority of tanks, where a proved chemical formula and technique are in use, the results are extraordinary.

This is the station's first season. While its work is still experimental, perfect tomatoe are already being grown in exceptional abundance, for a very low price, and without the hard labor, equipment, or expense of ordinary farming.

Vines are sturdy, high, and heavy with foliage. They are set much closer together than in ordinary garden culture. The clusters of tomatoes are bountiful, giving definitely more than the normal yield. The tomatoes themselves are vivid in color, firm and meaty in texture, with plenty of juice but no wateryness. Their flavor is rich, sweet, refreshing, in fact, literally perfect.

"Tray agriculture" is young but the principles on which it is based are old. Almost 80 years ago an American chemist, Dr. Julian von Sachs, listed the chemical elements a plant requires to grow. Supply those elements under proper conditions, the theory ran, and plants would sprout and flourish.

Recently various efforts to supply the necessary nutrition to seeds or roots of flowers and vegetables by artificial means instead of through the soil have

been tried. One system surrounded roots with sand in a flower pot and furnished the chemical elements by a drip arrangement from a tank. Another

system worked by inserting roots into holes bored in wood, floating on the chemical solution. These seemed fairly cumbersome and expensive in practice. Then science hit upon the method now being developed in Shenarock, with excellent prospects of practical success.

Since Dr. Harrold is a tomato expert, tomatoes were chosen for the test. For tomatoes, watertight cypress tanks were built, 12 feet long, a foot wide, a foot deep. Above these were placed movable trays, the same dimensions as the tanks except that they were only four inches high, with a bottom of chicken wire.

It is the chicken wire—an essential contribution made by the celebrated Professor W. F. Gericke of the University of California, pioneer of tray agriculture—which makes this type of water culture practicable. A layer of excelsior an inch deep covers the chicken wire, and above that a layer of shavings 3 inches deep.

Tomato plants meanwhile were grown from seeds in a seed tray by ordinary soil methods, either in a hot house or a cold frame. When the plants had almost reached their blossoming time, they were transplanted to the trays. Their roots were inserted through the shavings and excelsior into the tank, being careful to leave an air space between chicken-wire and liquid surface. The plants were spaced a foot apart in length down the tray and six inches apart in width. That gave 24 plants to each tray. The average space between tomato vines in field cultivation is between three and four feet.

SOLUTIONS STILL UNDER EXPERIMENT

The solution in which the plant roots were placed had as base 62 gallons of water to a tank, practically filling it. The rest of the elements filled a mere quart mason jar to be poured in each time. Others are added in minute doses with an eye-dropper. The chemical compounds used were: Sulphuric acid, nitric

acid, phosphoric acid (these three in the largest proportions), potassium hydroxide, ammonium hydroxide, calcium oxide, and magnesium oxide.

Tiny doses of "tonic" were added to this mixture with the eye-dropper—a few drops of manganese, boron, copper, zinc, and iron.

A wonderful thing happened next (within four or five days of planting in the tanks). The plants' ground roots, equipped to suck nourishment from soil but less adapted to liquids, dwindled and rotted off. In their place appeared water roots. Transformation of the tomato from a soil-growing plant was completed.

Now at full growth, clusters of water roots have spread richly and grown far down into the tanks. They even appear in the damp shavings and excelsior. The vines are firmly anchored in the chicken wire, although they require support above as in ordinary cultivation.

The only change in the fruit itself is in its perfection. There were practically no blights or diseases to affect it adversely. And nature has helped it along through a wonderful quality which Dr. Harrold picturesquely calls a "cafeteria idea." This is the faculty of plants, having available all the various elements they want for growing, to select and use exactly what they need in exactly the right proportions.

Where Chemicals Replace Earth



Results of the "tray agriculture" tests at Lake Shenarock—Dr. Gould Harrold displays roots of tomato plants (the tray has been tipped up to show how the roots grow down into the chemical tanks), while thick clustering tomatoes hang heavy on the plants.

Dr. Nathaniel Gould
Harrold,
Lake Shenarock, N.Y.
or
Winter 1938-1
608 West 113th St.
New York City.
Pleasantville,
W. Palmdale, N.Y.
1938

Copy from General Note Book XXV pp. 4, 41,
73, XXIV p. 76, 77. XXIII p. 146-147,



A. C. Pillsbury -
"Picturing Miracles of
Plant and Animal
Life" - gives ^{his} ~~the~~
formula for chemicals
used in soilless
agriculture

The N. J. Agricultural
Expt Sta, New
Brunswick, N. J. - all
these notes & has done
considerable work on
it. D. S. Stokes

Arthur C. Pillsbury of Berkeley, Cal., showing one of the luxuriant squash
vines in his very modern greenhouse, where he grows vegetables of un-
excelled perfection and in remarkable quantities by soil-less methods,
using tanks of water, chemically treated.

Soil-less Garden Successful

Boston Herald, Feb 6, 1938.

Possibility of producing potatoes at the rate of nearly 3000 bushels to the acre and clusters of tomatoes weighing 11 or 12 pounds, valued at \$50,000 per acre, and other vegetables in like unbelievable quantities is foretold by a new process of soil-less cultivation in tanks of water, chemically treated.

Pictures of experiments made in the past year in his small greenhouse in Berkeley, Cal., shown by Arthur C. Pillsbury, a former resident of Medford, Mass., awed and amazed a large audience attending the lecture given recently in John Hancock Hall, under the auspices of the Chestnut Hill Garden Club. Mrs. William Ellery is president of this club, which was the first to present Mr. Pillsbury to a Boston audience this season.

Mr. Pillsbury, a scientist who has long been noted for his remarkable motion pictures showing the growth and blooming of plants, the marvelous unfolding and closing again of the petals of a flower, the circulatory system of vegetation and the pollination by insects, has now experimented with other phases of horticulture that are revolutionary.

His 16 by 36-foot greenhouse in Berkeley is fitted up with many horizontal tanks, which are about 3 by 4 feet in size and 6 inches deep, each holding about 25 gallons of water. They are lined with asphalt paper and covered with coarse wire netting. On top of this he uses ex-

celsior, straw, shavings or almost anything that will give support to the plant and prevent the seeds from falling into the water of the reservoir below.

In motion pictures, he showed the planting of small sections of potatoes in this excelsior, and later the plants growing to amazing heights. He pictured beans sprouting, the roots shooting downward, and the tops pushing up, and later, gathering the beans in a basket. His corn grew luxuriantly to the ceiling, 11 feet high, across the greenhouse, and down, and averaged three ears to the stalk. In the open air, he explained, the vegetables would have surpassed their record indoors. From one of his tanks alone he harvested 123 pounds of potatoes.

Tomato vines grew 15 feet tall, and produced crops over an extended period. No hoeing, no weeding and no hard work were involved in this very modern method of growing vegetables, after the greenhouse with its tanks was completed. The chemicals used included calcium nitrate, magnesium sulphate, hydrogen phosphate, potassium nitrate, sulphuric acid, nitric acid, phosphoric acid, magnesium phosphate, calcium sulphate, borax, ammonium chloride and boric acid. Solutions already mixed are obtainable at reasonable cost from one of the commercial firms.

*High Fertilizer and
Aug 5 6 44*

*Grape vines - K. F. Reynalstie, Fredonia, N.Y.
From him I got 2 Brighton, 2 Niagara, 1 Warden,
all 3 yr roots, and he gave me two
others.*

*Viburnum Carlesii is the name of a
most fragrant flowering shrub that Anna Wolbach
has.*

The farmer's risks are

1. Drought
2. Hail
3. Heavy wind storms (for some kinds of crops)
4. Insect pests { above ground and
in soil
5. Plant diseases { on leaves, stems & fruit
on roots.

~~6. Soil diseases~~

6. Frost

7. Scarce yields due to poor seed

8. Weeds

9. High labor costs or shortage of labor

10. High taxes

11. Market losses.

12. High overhead for tools & equipment & power.

In water or tray agriculture all of these ^{most of them} are greatly reduced and 1 and 8 and half each of 4 & 5 are completely eliminated.

With this I can take a little land, not over 2 acres, perhaps not over 1 acre, in a barren hillside, if there is steady water

supply, and I can grow all I need for maintenance.
The labor is so immensely reduced that I can
do it in old age. Working out a combination
of this with other methods, perhaps by
use of peat moss, I could grow grapes also &
make raisins. Cf. pp 20-23 above. Combining
this with companion plants should help
control insect pests above ground. I can work
this in with Hy Diet splendidly. Could do it
easily in India or in mountain country anywhere.
Combine with the method of a greenhouse using
insulating material to retain heat.

Almost the only tools required are
a spray outfit, cans to mix chemicals,
hose, & auto pump.

It could be done in pots if wood for
trays were unobtainable ^{Papier's 'males' tubes.}
covered by glass.

Why not use water plants, in the solution,
to provide the needed oxygen? ^{Acute by pump,}
_{then only on cloudy days}

Will the water plants give off a little O_2 constantly even on a cloudy day, enough to supply the other plant roots?

Herbs: Westwood Oak Farm,
Bethesda, Md.

Why not try growing grapes by solution method, either using sand, or if ~~solid~~ slavings for support, then fill tanks with peat moss in winter.

If warm air is blown into solution it would help keep temp. right.

Could blueberries be dried like raisins? Use the big blueberries. ^{no seeds.}

Maybe some aromatic herbs would

repel air borne fungi as well as insects.
Of effect of cinnamon & other spices in
this respect.

McCotton on the cabinet method of growing grains for
fodder in 6 days reports that if the balanced max-
imum of vitamins A, B, C & E is desired 6 days
growth in these cabinets is the best. After that
the content of C increases while A & B decrease.
If E is especially desired, growth is kept up to
the 10th day, when C is at the maximum.
These ^{figures} hold true for all the grains, he says.
The optimum temperature for germination &
growth of milk seeds is 61° F.

Paraffined newspaper or cloth might be
laid inside a long trough of tar paper on sand
& then used for sand or cinder culture.

Might make a float valve with a bottle, glass,
tubing, etc. to maintain constant level of solution in

the tank.

At N.Y. Expt Sta they have got 20 lb
of tomatoes per plant in 4 months, grown
in greenhouse.

Frank Inty - "Field Book of Insects"
Putnam \$3.50. The best of all.

Dealers in flax seed

E. A. Beale, Beaver Dam, Wis. (Redwing)

John H. Kresin, Cedarburg, Wis. (Redwing)

L. L. Olds Seed Co., Madison, Wis.

~~See Piddling~~

To keep solution warm by sun, lay black-
painted bricks or materials of that sort on a sidewalk
& then move them at night close to the
tanks.

Get chemicals from Howe & French, 101 Broad St
Boston, Mass.

Electrical Floriculture

Condensed from Scientific American

Lawrence C. Porter

Illuminating Engineer, General Electric Company

RECENT RESEARCH has shown that the blooming times of plants is controlled largely by the total number of hours of light rather than by the intensity of the light. For example, plants which bloom in the spring and fall do so because in their natural environment they receive about eight hours of sunlight. Those which flower in the middle of summer do so because they have a total of 14 to 16 hours of light. Plants which normally bloom in the middle of summer can be made to bloom in the spring, or even in the winter, by supplementing the normal daylight with five or six hours of artificial light.

In the past it has been necessary to keep plants in the home close to windows in order that they may have sufficient light to grow. The success of supplemental lighting in greenhouses led to the development of plant light fixtures for use in the home. These consist of conventional types of floor or table lamps, except that higher wattage bulbs are used and flower pots have been attached to the fixtures. In these combination flower stands and lamps it is necessary to burn

the lamps only during the hours they would ordinarily be needed for general lighting purposes, namely from dusk until bedtime.

The value of supplemental lighting is demonstrated at the Santa Clara Ranch in California where botanists are developing new varieties of plants. Before supplemental lighting was used this process took from three and a half to five years, as the plants had to be grown from seed, cross-pollinated, and several crops raised. Since artificial light and soil heating cables were installed to speed up the growth of the plants, this time has been cut approximately in half.

In greenhouses, flashing lamps that go on for five seconds and then off for a corresponding period, have an effect on the plants quite comparable to that of continuous light, while cutting the current consumption and lamp renewals nearly in half. No matter what type of lamps are used they should be equipped with efficient reflectors to concentrate as much of the light as possible on the plants.

Another interesting development is being carried on at the University of California where

plants are being grown without soil. The bulbs or tubers are placed in a layer of straw held on wire netting at the surface of a tank of water which contains chemical nutrients, the roots going down into the water. By this means a much heavier crop of potatoes has been raised than has been possible when the potatoes are grown by the usual method in soil.

Several of the universities have been studying the possibility of growing plants in sand, furnishing the nourishment by means of liquid nutrients.

Perhaps the most interesting greenhouse development was last year's experiment at the Boyce Thompson Institute for Plant Research. There a greenhouse was constructed in which the walls, floor, and half of the roof were made of heat insulating material. There was a single row of glass sash in one side of the roof. This sash was set so as to admit the maximum amount of sunlight and the interior was painted white to reflect all possible light back on the plants. The only heat was generated by 500-watt lamps, used for supplemental lighting on the plants. These lamps were thermostatically controlled. It was found that even during the coldest

weather an even temperature of 68 degrees F. could be maintained when the sun was shining. On cloudy days the lamps burned occasionally and during the night they were off and on for periods totaling approximately six hours per night.

This experiment may revolutionize greenhouse construction. The results obtained were remarkable. Larger and better plants were grown than was possible in the conventional type of all-glass greenhouse. The plants in the heat-insulated house came into bloom in some cases eight weeks ahead of the controls in an ordinary type of greenhouse. It may be entirely practical to build greenhouses several stories high, greenhouses inexpensive to build and to operate. Then, too, small private greenhouses, fabricated at the factory, may be easily erected, at low cost, since there is no heating equipment to purchase and maintain. A result of the insulation is a higher humidity, with less watering of the plants. With thermostatic control of the temperature and ventilation, a house of this sort would be almost entirely automatic in operation, and there are already two concerns prepared to furnish such greenhouses.

CONTRIBUTIONS FROM READERS are welcomed for "Patter" and "Toward a More Picturesque Speech." *Such contributions cannot be acknowledged or returned.*

A payment of \$3 is made, upon publication, to the first contributor of each accepted item. In all cases, the source must be given.

" In an unheated greenhouse in California
552 lbs of tomatoes were picked from 20
plants growing in a tank 10' long $2\frac{1}{2}$ ' wide
and 8" deep, without any soil. The tank
was kept full of water, maintained electric-
ally at a temperature between 80° and 85° ,
and had 7 lbs of artificial dissolved in
it. Some of the plants grew 25' long.
The variety was Sutton's Magazine. The
plants were started in soil and
transplanted to the tank as seedlings
3 weeks old. "

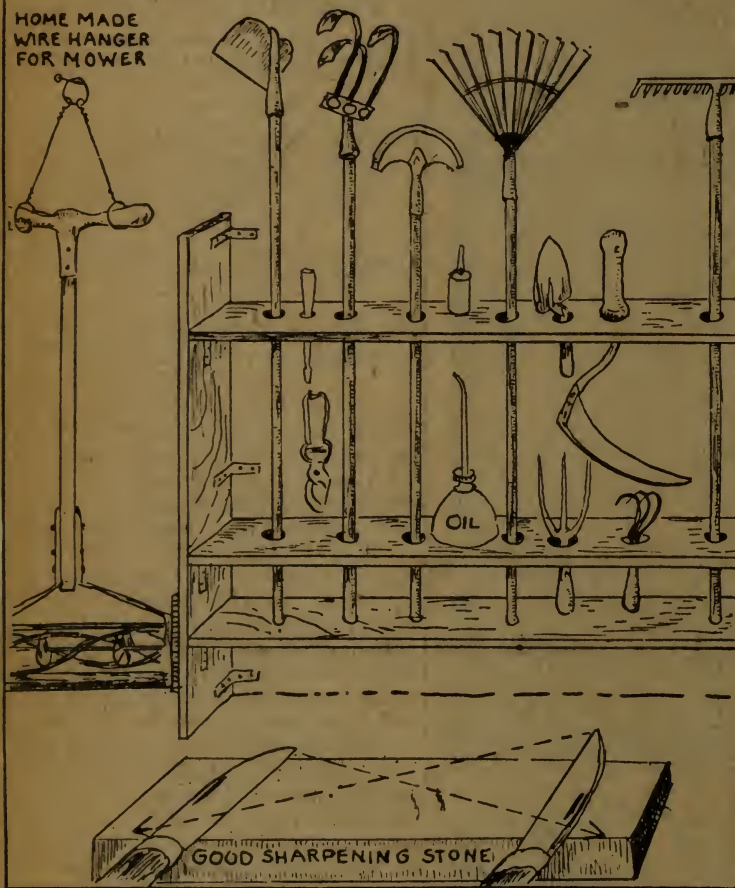
The Garden Notebook

(Keeping the Garden Accessories in Condition)

By Alfred Putz

WINTER CARE OF GARDEN TOOLS

HOME MADE
WIRE HANGER
FOR MOWER



Good tools not only last longer than cheap ones but also do better work and lessen the task to be done. They usually are worth the higher cost and deserve special care at all times. After cleaning up the garden in the fall most owners place their tools in some out-of-the-way place and forget about them until they are needed again in the spring. But spring is not far away and now is a good time to look them over and put them in working condition.

While garden tools should be kept clean at all times, it is particularly important to give them a thorough cleaning now. Remove all dirt which may

still be adhering, washing in water if necessary and scrubbing briskly with a stiff brush. Metal parts must be scoured with a stiff wire brush to remove rust. The actual working parts should be as bright and shining as they were when new.

Handles May Be Painted

Sand paper, emery paper, or emery powder mixed with thin oil, will be useful in cleaning the upper and lower surfaces of such tools as spades, spading forks, trowels and hoes. When the rust has been removed, oil or grease the bright surfaces to prevent or at least retard further accumulation of rust. Wooden handles which are wearing out should be replaced. Those that have begun to splinter can be smoothed with sand paper. To give them a neat finish you might paint them a bright color. This will make it easy to find them when left lying around the beds or borders during the coming season. Your neighbors who may call on you to borrow tools will also find the bright and distinctive colors a strong reminder to return them to you without delay.

Shears of all types should be thoroughly cleaned, overhauled and sharpened. If you are handy with tools you may do the work yourself, otherwise place them in the hands of a competent repair man. Before they are put in a dry-storage box give them a thin coating of rust-resistant oil.

The lawn mower should also come in for its share of attention. A thorough overhauling is needed at least once a year. Sharpening the blades of a mower so that they are true and cut properly with the least expenditure of energy is a job for an expert. Have him take the mower apart for cleaning and inspection of all bearings, and ask him to oil all parts after cleaning them. Pruning saws should also be placed in the hands of a competent man for setting

and sharpening of the teeth unless you know how to do this work yourself.

Few garden accessories are subjected to as much abuse as the wheelbarrow. Often it is left outdoors all during the year because of its awkward size. That is the more reason why it deserves a thorough overhauling at this time. Clean it thoroughly, tighten all bolts, replace wornout boards or fasten down those that have become loose. Give the wooden parts two coats of good paint and grease the axle bearing with a heavy lubricant that will stay in place.

To keep the wheelbarrow out of the way you may suspend it from the rafters of the garage or dry cellar.

The lawnmower is also easy to keep out of the way by hanging it up. Two stout pieces of wire make a good hanger. At one end of each wire make a large round loop that will slip over the handlebars of the mower. Small loops at the other ends are run through a steel ring that is placed over a strong nail. Such a hanger will be found exceptionally handy throughout the year to keep the mower out of the way when not in use.

Preserving Spray Equipment

One of the most disappointing factors which will confront many gardeners next summer concerns the various types of spraying equipment. While they were in perfect working order when last used, many of them will fail to function. The ordinary type of hand-sprayer will need taking apart and cleaning. Remove the pump and examine the leather washer on which the proper force of action depends. If this has softened or hardened excessively replace it with a new one. If it is still firm and pliable give a good application of oil to preserve its elasticity. After replacing the pump work it a few times until the washer seals the pump.

Sprayers which have rubber hose attachments must be examined for the condition of the rubber and a tight fit at the pump and nozzle ends. Washers which look worn or are soft should be replaced and the nozzle thoroughly cleansed of all foreign substances.

The garden hose is another much mistreated object. Of course, it should have been placed under shelter before winter set in and all water should have been drained from it. A hose reel is almost indispensable to protect the hose from sharp bends which are bound to ruin it within a short time. In rolling it up prevent undue strain on the rubber and fabric by stretching it. It should be loosely rolled to keep its round shape.

If you have several lengths of garden hose, examine the couplings to make sure they hold the hose end firmly. Also replace all old washers between the couplings with new ones of fresh, live rubber. Dusters with leather bellows may need a little leather dressing to preserve their pliability. Even the watering can should be spruced up by cleaning it thoroughly inside and out and giving it a coat of paint on the outside.

Plant stakes that were gathered last fall will need sorting over for those

that will serve another year. A coat of green paint will add to their lasting quality and make them less conspicuous in the garden. Seed boxes and seed pans will also come in now for a cleaning up, as they will soon be needed. Pruning knives always must be extra sharp. You will find that use of the extra fine grade (not the usual fine) carborundum stone, followed by a honing on a hard Arkansas oil stone or any good hone, will give the knife a razor-sharp edge that makes pruning a pleasure.

SUBSTITUTES FOR MANURE

Experience Reveals Satisfactory Soil Enrichers to Take Its Place

By E. L. D. SEYMOUR.

WITH the ever increasing difficulty of obtaining that old garden stand-by—"good, thoroughly decomposed barnyard manure"—gardeners are becoming more and more intensely interested in discovering what may best be employed as a really satisfactory substitute for it.

Despite the skepticism of some old-timers and horticultural die-hards, such substitutes have been discovered. For many years the agricultural experiment stations have been working on them—for the

problem of finding manure substitutes, since the advent of the tractor and the concentration of the dairy industry in the hands of specialists, has become quite as acute for many farmers as it has for the small-place owner.

As there is usually much planting to be done in the Fall, many gardeners begin in midsummer to prepare in advance their supplies of substitute manures of some sort, so that all may be in readiness when planting time comes.

What Does Manure Provide?

But before one can intelligently provide a substitute for manure he must, of course, have a definite idea of the function of manure in aiding plant growth. Just what is it that gives manure its unquestioned soil-building qualities?

The chemist's analysis of a short ton—2,000 pounds—of well rotted barnyard manure reveals that it is made up of 1,500 pounds of water and 500 pounds of dry matter. This 500 pounds of dry matter contain approximately 10 pounds of nitrogen, 5 of phosphoric acid, 13 of potash, 8 of lime and 5 of sulphur—a total of 41 pounds of chemicals—plus 459 pounds of organic matter, or "humus." In addition, it contains a supply of certain bacteria and other microscopic organisms which are essential in effecting changes in the soil—the "breaking down" of chemical compounds existing in the soil into simpler and more soluble forms.

In other words, manure is so valuable in gardening because it provides, combined in this one substance, three distinct soil aids: first, small amounts of the main plant food elements (nitrogen, phosphoric acid and potash) and also of lime (not a food element

but a "digestion accelerator" in the plant's diet); second, a supply of humus or organic matter which helps to change any uncongenial, unresponsive soil into moisture-holding, friable, productive loam; and, thirdly, an active, thriving population of bacteria beneficial to plant feeding and plant growth.

(over)

Make up flat baskets with the right ^{dietary} combinations of vegetables for a meal, & perhaps a chicken or eggs or cheese. Give time paper. Sell it as a unit. Thus train people to eat well, save them some thinking, make their mouths water beforehand, & make them want to come again. If we are in the South, get Negroes to make the baskets. Or do it with paper bags with the string handles.

This helps still further to eliminate the middleman. The primary producer produces ideas and health protection for the consumer, as well as the goods themselves.

Mrs. Susan B. Taylor, Dover, Vt.

Plan of an unheated pit 10 ft. Garden Club Fed.

of Mass. &

see

The Jerusalem artichoke stores its carbohydrate not as starch but as inulin.

These tubers also contain 10% to 12% of levulose. They are said to be more productive and easier to cultivate than potatoes. They are less attacked by insects. The Mammoth White # one of *J. artichoke* has been known to yield 15 tons per acre, whilst the average yield of potatoes is 3 T. per acre. (?) Two pounds of levulose is as effective for sweetening as 3^{lb} of cane or beet sugar.

Inulin heated with water or dilute acid is converted into levulose (D-fructose). It is sparingly soluble in cold water, very soluble in hot water.

Fructose "probably plays a different part in metabolism from glucose and seems to be more intimately connected with tissue formation, whilst glucose is more

Stems
tuber
rather
than
tubers

concerned with "respiration" - *Encyclopedia*
 Brit. 14th ed. Fructose = levulose =
 fruit sugar. Glucose = dextrose = grape
 sugar.

Note from Dr. Slivers paper

Formula I.

Solution for the Growth of Plants in Water Culture & Sand

Culture Solution *

Major Salts	Monobasic potassium phosphate KH_2PO_4	Calcium nitrate $Ca(NO_3)_2 \cdot 4H_2O$	Magnesium Sulfate $MgSO_4 \cdot 7H_2O$	Ammonium sulfate $(NH_4)_2SO_4$
Molar concentrations	.0023	.0045	.0023	.0007
grams per 5 gallons of solution	5.9	20.1	10.7	1.7
Teaspoonful per 5 gallons of solution (approximate)	$1\frac{1}{4}$	4	$1\frac{1}{2}$ $2\frac{1}{2}$	$\frac{1}{2}$

* To supply the trace elements iron, boron, manganese, and zinc, 2 teaspoonful of the following trace element stock solution are added to each 5 gallons of culture

Figures in pencil are revised from index of growth of Plants

solution.

Trace element salts	Trace Element Stock Solution			
	Ferric Sulfate $\text{Fe}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$	Boric Acid H_3BO_3	Manganese Sulfate $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$	Zinc Sulfate $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$
Grams per pint	2.5 g	1.4	0.9	1.1
Teaspoonful per pint, approximately.	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

Formula I. To prepare this solution, the required amount of each major salt as given in the formula is weighed out, and, to avoid precipitation, each salt is dissolved separately in a pint or more of water. The four solutions are then mixed together and water is added to make a volume of five gallons. To the five gallons of culture solution are now added two teaspoonful of the trace element stock solution. The culture solution is now complete and ready to be applied to the plants, either in solution culture

or in sand culture. The trace element stock solution may be prepared by dissolving together in a pint of water the quantities of the salts designated in the formula. (Probably also needs a trace of copper).

Sand supplies good support and an effective aerating system, obviating the need for artificial aeration.

Sand culture gives comparative freedom from soil borne diseases, more rapid growth than is attained in soil, ease with which the root systems can be removed from the seed bed without injury - for transplanting, relatively high control of the nutrient supply, thus largely controlling the type and quality of the plant desired. Excellent for seedlings.

To remove seedlings from the sand,

flood the bed with water & then slowly withdraw the roots, aided by a knife blade. Dip in water to remove sand. To put it in another sand bed, dig a hole in the moistened sand big enough to take the entire root system. Then flood with solution, washing the sand around the roots. For it to pack sand around roots.

Solutions prepared from crude salts of the grade of commercial fertilizers, when properly prepared, are equal in plant producing value to solutions prepared from salts of high purity, and are less expensive than the refined salts. Such salts usually have the trace elements as impurities, but it is well to add them, to be sure.

(see over)

The bag

Formula 2.

Solution for water culture and sand culture, prepared from salts of the grade of commercial fertilizers.

Major salts	Super-phosphate (mono-calcium phosphate plus calcium sulfate)	Sodium nitrate	groom salts (magnesium sulfate)	monoxide of potash (potassium chloride)
grams per 5 gallons of solution	5.8	4.7 ^{6.4}	14.0 ^{10.3}	3.9
Teaspoonful per 5 gallons of solution (approximate)	2	1	3 ^{2 1/2}	1

To prepare this solution, the specified amount of each salt is dissolved separately and as completely as possible by shaking in a pint or more of water. Any insoluble material, such as is always present in superphosphate in particular, is allowed to settle out completely. The clear supernatant liquid is then decanted and this only is used, the sediment being discarded. The four single salt solutions are then mixed together and made up to five gallons by the

addition of water. While the addition of trace elements to this solution is ordinarily not required, no harm can result from the addition of half the quantity (one teaspoonful) of trace element stock solution designated in formula 1. The addition will serve as a precautionary measure against the occurrence of any deficiencies, and in some cases might prove quite beneficial.

My tomatoes started in tank on Thurs. May 26. ¹⁹³⁸
Cold weather, including a hard frost, for a week.
Did not add iron + till Sat ~~Feb~~ 28th.

"Soilless Growth of Plants" by Carleton
Reinhold
Ellis & Miller W. Swaney, N.Y. 1938, \$2.75
(hard)

"Soilless Growth of Plants" by
Carlton Ellis & Miller W. Swaney (of 4)
Expt Sta). Reinhold Publ. Corp. ^{Book} Dept.
330 West 42 St., N.Y.C. 1958. ^{10.75}

gives other formulas & much other data.
They advocate for trace solution:

"Stock Solution A." "In $\frac{1}{2}$ gallon of water
are simultaneously dissolved 3.2 grams (1
teaspoonful) each of boric acid (H_3BO_3),
manganese sulfate ($MnSO_4 \cdot 7H_2O$) and
zinc sulfate ($ZnSO_4 \cdot 7H_2O$). To
this solution $\frac{1}{8}$ teaspoonful of copper
sulfate ($CuSO_4 \cdot 5H_2O$) is then
added if desired. Stock solution A
may be added to culture solutions at any
time before use.

"Stock Solution B." "Dissolve 0.8 gram
($\frac{1}{4}$ teaspoonful) of iron (ferrous) chloride
($FeCl_2$) or nitrate ($Fe(NO_3)_2$) in

Soil Erosion in Principal N.E. Watersheds

Soil Conservation Service

- ☐ little or no erosion
- ☒ slight sheet erosion
- ☒ moderate sheet erosion
occasional gullies
- ☒ severe sheet erosion
occasional gullies



Index of watersheds

1. Connecticut River
2. Delaware River
3. Susquehanna R.

4. Potomac R.
5. James R.
6. Ohio R.

This shows most of eastern Maryland watershed, also most of N.E. of N.Y. of N.J., and part of V. ca south of the Potomac watershed. Some of the Potomac watershed is watershed.

1 pint of water. Ferric sulfate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) may be used as a source of iron but has a greater tendency to precipitate from solution before use. Fe^{+++} As iron has a tendency to precipitate in contact with culture solutions, Stock Solution B should only be added immediately before use with plants. Fe

"In using any of the culture solutions described hereinafter, Stock Solution A may be added in the proportion of 10 c.c. (2 teaspoonfuls) to each 5 gallons of culture solution if pure chemicals are used, or in the proportion of 5 c.c. (1 teaspoonful) to each 5 gallons of culture solution if commercial grade chemicals are employed in preparing the culture.

"Stock Solution B should be added to culture solutions just before actual use in the proportion of 20 cc (4 teaspoonfuls) of B to each 1 gallon of the mixture.

[15.4 grains = 1 gram

28.3 grams = 1 oz.

453 grams = 1 pound (avoirdupois).

473 cc. water = 473 grams water = 1 pint.

level teaspoonfuls are referred to.

Only approximate in relative wts.

There is a little electric pump made for kerosene supply for kitchen burners. Maybe this could be used to circulate water in tanks, or at least to supply fresh water.

D. E. P. Felt, Bartlett Trees
Research Sals, Stamford, Conn.
ref. Mrs. White

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D. E. P. Fault, Bartlett T. res.
Research Lab., Stamford, Conn.
ref. Mrs. Wheeler

In relation to what I know now about
diet, I should rely on raisins (grapes),
blueberries, figs & dates, plus apples & pears
for my carbohydrates, leafy & root vegetables,
cucumbers, ^{tomatoes} honey, milk & soy beans plus
maybe a goat. Dig a pit for cool storage.
Have a pit hot house for winter use, to
raise fresh vegetables throughout the
winter. Heat it with warm brine & a
heating stove. Insulate with Alfoil.
Four tomato vines, enough rows of lettuce to
provide a head every 3 days, a row of
cucumbers.

Harris Seed Co., Coldwater, N.Y.
via Aristocrat melons, — Jim Powers records

"Chemical Gardening for the Amateur"
by Connors & Tiedje, W. & Co., 1939, \$1.95

Amazing
new book

1939

GROWING PLANTS WITHOUT SOIL

By D. R. Matlin, M.A.

Chemical Publishing Company of N. Y., Inc.
\$2 at leading book sellers—See ad in Garden Section

They Ask Me . . .

B. G., Aurora, Ill., looks for a book on herbs called "Magic Fragrance," by Mrs. Clarkson. I keep on hand and reasonably up to date a list of herb books—it will be sent to any one interested—but this one is not on it and I would be glad to know about it. The latest additions to this list, by the way, are two of the most alluring garden books you would want to own: "Old-Time Herbs for Northern Gardens," by Minnie Watson Kamm (Little, Brown), illustrated with lovely little outline drawings and fine photographs and giving history and directions for growing and use, and "Herbal Delights," by the celebrated authority, Mrs. C. F. Leyel (Houghton), whose esurient sub-title reads: "Tisanes, syrups, confections, electuaries, robs, juleps, vinegars and conserves"—words fit to rouse fury in anybody on a strict diet.

EASY to TEST YOUR SOIL

In ten minutes' time, this easy-to-use kit will give you just the soil information that you need to lay out an intelligent fertilizing program. New larger model makes 20 individual tests for nitrogen, phosphorus, potash and acidity. Made by the same laboratories which manufacture most of the field testing equipment used by government stations and professional growers. If your dealer does not carry it send \$2 direct to Sudbury Soil Testing Laboratory, P. O. Box 801, South Sudbury, Mass.

AT YOUR SEED DEALER



SOILLESS PLANT CULTURE SIMPLIFIED

By ALEX LAURIE

Professor of Floriculture, Ohio
State University

MUCH bewilderment has been expressed recently about the method of growing plants without soil. We have been taught that good "rich" soil was needed to grow plants satisfactorily. This "richness" implied the use of manure or other fertilizers to supply the needs of the plant. Considerable stress was and is still placed upon the necessity of organic matter or humus in the soil. All this is true. Then how can we attempt to grow plants without soil?

The answer involves no trickery. We can go back to the work of Woodward in 1699. He grew peppermint in different water solutions. Since then a great deal of work has been done in the laboratory, where plants were grown and flowered and fruited in water or sand to which the necessary elements for plant growth were added. Actually, there is little difference between these old methods and the newest ones. In soil, the humus and the various bacteria organisms and others make the various elements available to plants so that they may be absorbed by the roots. In water, sand or gravel, we use materials which are readily available so that the roots may absorb them.

Anchoring the Plants

One of the first difficulties to be overcome lay in the method of "anchoring" the plants when they were grown without soil. Since water by itself could not be used for the purpose, a scheme was devised in which a waterproof box was filled with water and the necessary elements of nutrition added.

Because of complicated difficulties we have come to the conclusion that in spite of the publicity given, a better method is to substitute some coarse material, such as gravel or cinders, for the water. That enables us to keep the plants firmly rooted, solves the problem of support, gives us sufficient air and makes the process more feasible and practical.

Actually, how would one go about

doing all this on a small scale in the home, the greenhouse or the garden? First, it is necessary to start the seedlings. A shallow box, a "flat," such as is used by florists, is filled with sand, and over this is poured a solution made by dissolving one ounce of nitrophoska (15-30-15 fertilizer) in two gallons of water. The sand is thoroughly drenched with this solution, and the seed is then sown in the same manner as in soil. In a short time—as soon as the second set of leaves has been developed by the young plant—the seedlings will be ready to transplant to more permanent quarters.

Permanent Quarters

These permanent quarters may be a box of any size, about six inches deep, which is made waterproof by coating with asphalt paint (not tar). One end of the box has an opening and a half-inch pipe or tube is inserted into an inverted trough placed along the bottom, as shown in the diagram. Connected to this pipe by means of rubber tubing is a bucket large enough to hold a quantity of nutrient solution which will fill the box to within one inch of the top. The box itself may be filled with gravel or cinders, with individual particles of about one-fourth to one-half inch in size.

The actual operation of feeding consists of raising the bucket to a height above the level of the box, so that the solution will run into it by gravity. As soon as the box is filled the bucket is lowered and the solution drains back into it. The solu-

tion is used over and over again. The easiest way to figure the size of the bucket is to measure the cubic contents of the box and then take one-third of this figure as the amount of solution needed.

Our tests have indicated that this solution should be used about four or five times per day.

HERBS AS PEST REPELLENTS

Some Species Grown in Gardens Are Found To Discourage Troublesome Insects

By FRANCES H. CURRAN

Time has in no way diminished the infinite uses of herbs but has brought to light more applications and modern uses for these practical and historical plants. As long as man can remember herbs have provided in manifold ways food, medicine and esthetic enjoyment. Recently another utilization has been discovered that should prove particularly interesting not only to professional horticulturists but to every amateur back-yard gardener.

John Dukinfield and Carol Barrett, recognized authorities in this field, have found after several years of observation and research that a wise use of herbs will act as a deterrent to many of the destructive insects that work havoc in gardens. Even the Japanese beetle, against which gardeners and scientists are constantly fighting, seems to keep clear of their herb garden, which is situated in an area of Long Island infested with this pest. The owners attribute this mainly to the excessive vitality that characterizes herb life.

Herbs Not Overbred

"Destructive insects feed mostly on weak plants or those that have started in on a slow process of decay," Mr. Dukinfield observed. "Many of the plants to be found in modern gardens are so overly nurtured and highly bred through incrossing that their natural vitality and powers of resistance are greatly weakened, leaving them easy prey to various kinds of insects, beetles, aphids and other parasites. Our forebears did not complain of such widespread insect invasion in their gardens, though similar insects no doubt existed during that period. It seems reasonable to assume that these insects have found sufficient numbers of devitalized plants among the newer sorts—created by a desire for new colors and bigger flowers—to enable them to increase rapidly.

"This is a theory that can open a great deal of discussion, but the fact remains that many kinds of garden pests are now with us, and something must be done about it if we wish to have healthy and better gardens as the seasons roll by.

Herbs have been proving the efficacy of their virtues and values for countless ages, so perhaps we have made our researches for antidotes too far into scientific fields instead of realizing that nature provides antidotes for all her poisons and ills, and it would therefore seem wiser to search for cause and effect along the paths of nature."

Herb Planting Advocated

Mr. Dukinfield advises clients who complain of a great number of destructive insects in their gardens to plant borders of herbs around beds. Thyme, santolina and the pungent southernwood are often effective in lessening infestation. Some gardeners believe that the castor-bean plant is helpful in keeping moles out of the garden. Mr. Dukinfield and Miss Barrett have also blended a mixture of dried herbs that is very effective as a moth repellent. Pyrethrum, a medicinal herb of long standing, has been used as a base in the manufacture of some of the best known commercial insecticides for many years and is widely recognized as of value in the Pharmacopoeia of the United States.

Other herbs with insect-repelling qualities are blessed thistle, hysops, both pink and white, sweet marjoram, lavender and Winter savory—all vital, pungent and healthy in growth.

"Also try the simple experiment of placing sprigs of fresh mint, preferably spearmint or julep mint, near ant runs and watch the ants turn away from it," Mr. Dukinfield suggests. "These facts point the way to herbs that have for ages past been used as insect repellents, so that a further and modified use

seems logical and practical in retarding the annual invasion in our gardens."

Mr. Dukinfield finds that some varieties of herbs are naturally more effective than others in discouraging pests, and he is continually experimenting to confirm his opinions. He and his partner are designing a special herb garden for the "Gardens on Parade" at the World's Fair in 1939, and hope by that time to have further announcements concerning modern uses of herbs.

Goal of Food Chemists

What is expected of German science is clear enough. Some way must be found to stretch the efficiency of vegetable albumen, without depriving industry of necessary raw materials. So we find the chemists busily at work. German science sees salvation in yeast. In the dry state it contains from 50 to 55 per cent albumen and 8 per cent ash. Grow yeast—its cells multiply rapidly—and albumen is produced. What is more, yeast can form albumen out of non-albumen. Pasteur and Duclaux showed that long ago. In Germany yeast was cultivated on a huge scale with the aid of watered molasses to which nitrogenous salts had been added.

In other words, yeast obligingly made albumen (protein or edible nitrogen) out of minerals that contained nitrogen. The process died, industrially speaking, because it could not compete in time of peace with cottonseed cakes for cattle or soy bean in various forms.

Germany is returning to this abandoned yeast process and trying to increase its economic efficacy. Today wood is converted into sugar, which is, in turn, dissolved in water (as a substitute for molasses) and d to yeast. Economic success has been attained.

1. Julep mint and spearmint

Cape Codder Makes Big Profit In Water-Grown Tomato Crop

*Author Tom
Brent
June 1938.*

Woodward Employs Chemical Solution at Hyannis Greenhouse

By Bernard Peterson

A \$2400 tomato crop at a \$400 production cost, without hard work or backache, is Cape Cod's entering wedge into the new era of soilless agriculture.

W. L. Woodward, a resourceful chemical engineer, has already harvested an experimental crop and is speeding his second crop toward maturity without the use of soil in his greenhouse at Bass River, Hyannis, and he declared today that waterculture will be generally adopted within ten years.

"You have demonstrated with magnificent plants that tomatoes can be grown in water. Are you willing to say that your undertaking is economically sound and profitable?" I asked Mr. Woodward.

He replied, "You can grow almost any other crop by this method, and my conviction is that any grower who doesn't adopt it is going to get lost in the shuffle in ten years. I wouldn't think of doing it any other way.

"You inquire about the economics. The original cost of the greenhouse and equipment was \$4000; I now have a durable building; growing in there today are 8000 perfect, flawless plants. I expect to pick 6000 pounds of ripe tomatoes in January, February and March and sell them at 40 cents a pound, wholesale. That will yield \$2400, and the total cost of production will have been \$400. Then, I will pick up about \$400 more in the summer, so that my net will be \$2400."

This is the first commercial enterprise of its kind reported in Massachusetts. A number of persons are known to be testing the principle of waterculture here. One experiment was carried out at the Waltham Field Station.

The Woodward greenhouse looks like any other greenhouse; but, instead of soil long water-filled vats line the building. Resting on them are shallow boxes with chicken-wire bottoms spread over the wire is a layer of excelsior. Small tomato plants, grown elsewhere in soil, are inserted through the excelsior and wire so that the roots touch the water. Then the excelsior is pushed close up to the stem to support it. Later the plant is tied with strings from the ceiling.

Growth is stimulated by certain chemicals added to the water. Mr. Woodward went to the University of California to learn about this process and to get the formula for the growing-solution; but he has departed considerably from the California technique.

"Do you employ different chemical solutions for different kinds of vegetables?"

"No. You can use the same formula for all plants. And in ten minutes I can show anyone what to use."

"How expensive are the chemicals?"

"They cost me \$35 a year for 8000 plants."

Vines are unusually sturdy, high and heavy and can be kept alive and productive over a long period, but Mr. Woodward said that he will permit his plants to rise only to nine feet, because of the difficulties in picking at higher levels. The growth can be shortened three weeks with waterculture. Among the chemicals useful in such solutions are sulphuric acid, nitric acid, phosphoric acid, potassium hydroxide, ammonium hydroxide, calcium oxide and magnesium oxide.

Even hormones are used by Mr. Woodward as a little extra tonic, because it promotes root growth.

"Reinforcing" the Compost

For example, 6 pounds of ammonia sulphate, 3 of superphosphate, 2½ of muriate of potash and 5 of pulverized limestone could be combined and sprinkled on at the rate of a pound or a pint for every 4 cubic feet of sand and compost. Thus a pit 2 by 4 feet would require 2 pounds, or a quart. These quantities would be enough for more than a single pile. Any additional amounts of these fertilizers, or of a mixture of them, may be used in the garden or stored for another year; or they may be shared with neighboring gardeners. Seedsman



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Promise of Easing Nation's
Surplus Crop Problem

OLD HANDICAPS OVERCOME

My Times
Flavors Preserved by Method
That Gives Starch Industry
a Year-Round Activity
Feb 1935.

Aided by the Chemical Foundation and the Department of Agriculture, Dr. E. F. Hopkins, assistant professor in the New York State College of Agriculture, has developed at Laurel, Miss., a process which will make it possible to dry fleshy vegetables more effectively than ever before and to store them indefinitely. As one immediate result of his work, factories that extract starch from sweet potatoes can now operate the year round.

Drying as a method of preserving is old. It cannot be economically carried out just by spreading fruit or vegetables in the open air. Huge areas are required. Bad weather ruins the spreadings.

Indoor drying with artificial heat brings about undesirable chemical changes. In sweet potatoes, for instance, starch is reduced to a sort of paste which is useless in starch making. In some vegetables a tough, horny coating is formed which is waterproof and which slows the drying process. Sometimes the flavor is changed by heat. Above all, there is the cost of fuel.

Advantages in Use of Vapors

Heat has the great advantage of increasing the permeability of the plant tissues, so that the water can escape. The problem, then, was to discover a way of obtaining the same effect with no heat or little heat. Vapors and gases, such as ether, chloroform, carbon tetrachloride, chlorine and benzol, have the desired properties. And they do not affect the plant chemically. Best of all these agents is sulphur dioxide.

Seal vegetables in a jar with chemical vapors by way of experiment and the juice leaks out of the cells. A vegetable thus treated resembles a snowball that has been soaked in water. Relieved of the internal pressure of the juice, the now permeable cells simply collapse. Beans, beets and potatoes become flabby and limp.

Gassed, pressed green beans look like blades of coarse grass; beets like thin disks. They dry in air in about thirty-six hours, even two hours if the air is heated to only 120 degrees Fahrenheit.

Beets and string beans can be reduced to 15 and 18 per cent of their weight respectively after they are pressed, and sweet potatoes to about 50 per cent. The juice is always clear, which indicates that the plant tissue acts as a filter.

This juice always has been a problem to the manufacturer of potato starch. If it is not removed by drying it has a harmful influence on the manufacturing process. And when evaporated it is lost. Now it is not only possible to remove it but to collect it and turn it into a valuable by-product. It consists largely of sugar. And sugar can readily be converted into alcohol.

In actual practice Dr. Hopkins finds it best to grind up the vegetables and then to turn on sulphur dioxide. Whereupon the pulp is put into a centrifugal separator and the juice whirled off like cream from milk. The remaining cake contains less than 40 per cent moisture and crumbles easily. A little more drying at low temperature and it can be stored indefinitely as it is, or ground to a meal.

The sulphur dioxide passes off in the final drying. So long as it is present there is no danger of rotting through fermentation. Nor is there any after drying. Thoroughly dried vegetables do not ferment.

Boon to Starch Industry

It is easy enough to imagine the consequences of Dr. Hopkins's work. Sweet potatoes must now be harvested and converted into starch in ninety days. When the season is over the factories have nothing to do. Their efficiency is low and the losses are large.

Usually the potatoes are piled up in outdoor bins before the factory can grind them up. In that interval some of the starch is changed to sugar. There is also some rotting of potatoes in bad weather. With this new process there is no reason why a factory should not operate the year round, drawing on dried, stored potato pulp or meal as it is wanted.

Farmers gassing their vegetables, whirling them in centrifugal machines, driving the pulp in a shed

with a low fire and hauling the pulp to some central factory—the prospect is there. A single truck would probably hold the dried potato or vegetable crop of an average farm. Possibly the process may play a part in solving the surplus crop and in converting culls and other wastes into values.

*Get cold
climate California
is much
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Co., Fredonia,
N.Y. These
are thin skinned
and can be
made into raisins.*

*Bunker Asphalt
Co makes real
asphalt felt.*

- One advantage in chemical farming is that the available water is not wasted in evaporation, weeds, or seepage, but is used most effectively by the plants which produce. So it is a resource in time of drought.

Combine Mason & chemical farming. In center of top Mason patch have gravel & then a bed of sand and sink in it a flower pot of chemicals. Turn the drip in that once a day, or give it the solution once a day & drip the rest.

Though chemical gardening may cost more in the first instance, ~~than~~ the cash value of time saved in weeding, cultivating, etc is greater, and the savings on risks of all kinds and better quality & earlier stuff & ∴ better prices.

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 ... Apply to silicon
 ... a more stiff brush.
 ...
 ... 100 ... 100,
 ... pairs to 2.

1958. W. J. Moore, U. S. Dept of Agriculture,
 Washington, DC. is the authority on the
 cultivation of the edible soybean in New
 England. Why not try the soybean on
 a combination of Maori & domestic drip
 farming?

For 25 gals of nutrient solution

1 level tablespoonful of K_3PO_4

4 " " " KNO_3

~~7~~ " " " $Ca(NO_3)_2$

4 " " " $MgSO_4$

plus trace solution made up of
1 teaspoonful iron tartarate to 1 qt H_2O .
Use a cup full per tank whenever yellows
show. 1 teaspoonful boric acid to 1 gal
 H_2O . $1\frac{1}{2}$ pints of this to each 25 gals
of nutrient sol.

1 teaspoonful of $MnSO_4$ to 1 gal H_2O

1 " " $ZnSO_4$ " 1 " "

1 " " $CuSO_4$ " 1 " "

Use 1 pint Mn sol, 4 teaspoonful
 Zn sol + 1 teaspoonful Cu sol for
each 25 gals of plant food. Write
to division of plant nutrition, U. of
Calif. Berkeley.

Other work being done on this at
Purdue, U of W is, & Bureau of Plant
Industry, Washington

By keeping the sand & solution at
proper temperature and perhaps experiment-
ing with the solution formula, it
may be possible to raise mushrooms
this way.





